Texas Stream Team *Caring for Our Waters*

Headwaters

River Systems Institute Texas State University-San Marcos EPA Region 6 TCEQ *Winter/Spring 2008*

Texas Watch is Now Texas Stream Team!

by Eric Mendelman, Texas Stream Team

Texas Stream Team
Caring for Our Waters

Most of you are aware that Texas Watch has been exploring a new brand. We recently finalized our decision, and effective immediately, our new name is Texas Stream Team, with a tagline, "Caring For Our Waters." The next six months will be a transition period in which we will refer to the program as "Texas Stream Team, formerly Texas Watch." By next fall, we hope that the new brand will be sufficiently recognized so that the name Texas Watch can retire from the volunteer monitoring world.

We understand that this will be a big change for many of you, as it is for us. I joined Texas Watch in 1991, six months after the program started at the Texas Water Commission. Like you, Texas Watch has rolled of my tongue so easily that it has been difficult making the switch even with something as simple as a phone greeting. Many of you may wonder, with such a tried and true name as Texas Watch, what would motivate the program to change it?

There are two major reasons. First, there are other organizations using the name Texas Watch that have different missions and constituencies than ours (try a Google search on Texas Watch to see some examples of this). Second, in some circles the "Watch" component of the Texas Watch name has created the impression that the program targets suspected polluters. As we all know, however, the Texas Watch program's scientific and standardized protocols were established in order to prevent biased sampling and "vigilante science."

When Texas Watch moved to the River Systems Institute in 2006, we began working to identify a brand that was both unique in Texas and expressed more accurately the program's goals and mission. Texas Stream Team fits these criteria. The tag line, "Caring For Our Waters," expresses our understanding that streams are only one component of a life-sustaining system that includes aquifers, springs, rivers, lakes, estuaries, and oceans. It also reflects our programmatic mission to care for these water resources. As an added benefit, we anticipate that the name Texas Stream Team will facilitate opportunities for greater collaboration with the agricultural community as we all turn our focus increasingly to impaired and threatened water resources. Now, more than ever, it is critical that we work together for the sake of our future water resources.

I want to thank the many Texas Stream Team partners and volunteers who have been so supportive and encouraging through this big transition. I look forward to the next steps as we take on the immense challenge of water resource protection as members of the Texas Stream Team. ●

In This Issue...

The preparation of this publication is financed through grants from the U.S. Environmental Protection Agency through the Texas Commission on Environmental Quality. Printed on recycled paper.

Nonpoint Source Pollution –

The Problem of Sediment

by Heidi Moltz, Texas Stream Team

Sediment pollution is a common water quality problem in Texas. Many Texas Stream Team monitors have seen the effects of increased sedimentation in their local waterways. But what is sediment and where does it come from?

The movement of water, wind, and ice across the land's surface wears away the rock and soil, carrying the particles from their source. This process is known as erosion. Erosion of land surfaces and stream banks produces sediment through a three stage process. Particles are detached from their original soil or rock body. Then, the detached particles are transported by flowing water, wind, or other forces. Finally, the transported particles are deposited in a process known as sedimentation.

Geologic or "natural" erosion is an inevitable process that takes place continually. This slow process, however, is greatly accelerated by human activity. Today, sediment is a major global concern that threatens water supplies, recreation, and wildlife and associated habitat. Sediments can carry with them other pollutants like pathogens, nutrients, and toxic substances, further exacerbating water quality problems.

The rate of soil erosion is affected by several natural and anthropogenic (human caused) factors including:

• *Rainfall:* Intensity and duration of rainfall affect erosion rates. High energy rainfall over short time periods as well as low energy rainfalls over longer periods can produce significant erosion.

• *Soil:* Soil erodibility is dependent upon soil texture and percent organic matter. In general, soils with faster infiltration rates, higher levels of organic matter, and improved soil structure have a greater resistance to erosion. Sand, sandy loam, and loam textured soils are often less erodible than silt, very fine sand, and certain clay textured soils.

Sediment (cloudy water) enters a storm drain near a construction site in San Marcos during a rain storm.

• *Slope:* Slope angle and length can have a large effect on erosion. Steeper slopes are more susceptible to erosion. Erosion also increases as the slope length increases due to the greater accumulation of runoff.

• *Vegetation:* Plant cover can prevent erosion by stabilizing soil and minimizing soil damage from raindrop impact. Different types of vegetation can provide varying degrees of protection.

• *Conservation practices:* Land management practices implemented to control erosion like vegetative riparian buffers and silt fences can reduce soil loss.

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Headwaters
Vol. 1, No. 1, 2008

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.

Acting Program Director
Jason Pinchback

Grant Coordinator
Eric Mendelman

Education Coordinator and Newsletter Editor
Dr. Julie Tuason

Volunteer Coordinator
Heidi Moltz

Administrative Coordinator
Terry Wendland

TCEQ Texas Stream Team Project Manager
Corey Horan

Graduate Assistant
Nirmala Karunarathna

River Systems Institute Director
Andrew Sansom

Subscriptions:
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 send your email request to texas_watch@geo.txstate.edu. To receive the newsletter by email, go to the Texas Stream Team website listed on the back cover and click on "Subscribe to Our Newsletter."

Contributions:
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 jt07@txstate.edu.

River Systems Institute Undertakes Cypress Creek Study

by Marc Speir, Texas State University-San Marcos

The River Systems Institute at Texas State University-San Marcos is in the process of coordinating a major study on the Cypress Creek watershed in and around Wimberley.

A three-year grant amounting to $360,000 from the Texas Commission on Environmental Quality (TCEQ) and numerous community partners will fund the research designed to sustain the health of the creek.

The creek, which ultimately flows into the Blanco River and serves as a significant recharge zone for the Trinity Aquifer, is undergoing change due to rapid land development for commercial and residential uses.

Andy Sansom, director of the River Systems Institute, says the organization will provide a sensible approach to the research through sound science and unbiased information.

"Everything is based on hard science and designed to get complete input from all stakeholders," Sansom said.

Sansom compared the importance of Cypress Creek to Wimberley area residents to that of the San Marcos River and its value to the students and citizens of San Marcos. "It's a defining part of the community," Sansom said. "With sites like Jacob's Well and Blue Hole, it's incredibly beautiful. We're also really excited and invested in it because Cypress Creek is in our neighborhood."

Faculty from the Department of Geography and Department of Biology will manage the project. The Texas Stream Team will assist in compiling research with students and university personnel.

"It's an opportunity to work with the community as land uses change," said Jason Pinchback, grant specialist for the Texas Stream Team. "Together, we can act to keep the creek alive while also growing the region."

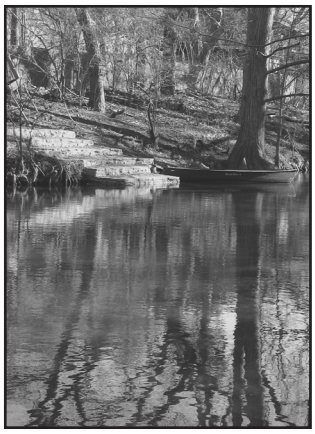
The multi-phase project seeks to define the current state of the watershed, gather input from community stakeholders, and develop a scientific tool chest for local decision-makers.

Vicente Lopes, professor in the Department of Biology, is creating a user-friendly computer interface to archive all data from the project and will train local stakeholders on the use of a decision support system based on a complex set of models.

Pinchback says the public still has the opportunity to actively manage development on the creek and its environmental impact.

"The input from the community is the driving force for this project," said Pinchback. "We want leaders from groups across the Cypress Creek watershed to get involved."

One of those leaders is Jack Hollon, vice-president of the Wimberley Valley Watershed Association and director of the Hays-Trinity Groundwater Conservation District. He says spots along Cypress Creek dried up and stopped flowing in 1999 and in the summer of 2000.



Cypress Creek along the Nature Trail in Wimberley.

"That's when we knew we needed to look at this more seriously," said Hollon. "It became vital to know the amounts we were pumping."

Hollon also says other concerns need evaluation such as impervious cover, amounts of silt that slow water flows, protecting sections of water with critical recharge zones, limiting chemicals such as pesticides and herbicides from flowing into the creek, and measuring numerous other water quality parameters.

"We need a different system to study the water and what is being done to it," said Hollon. "And we are very excited that the River Systems Institute is going to help make that happen." The research is scheduled to end August 2010.

The River Systems Institute wants to hear input from the community concerning the direction of the study. Information on the project and future meetings can be found at xxx

Co-sponsors of the project include Hays County, Hays-Trinity Groundwater Conservation District, Wimberley Valley Watershed Association, Village of Wimberley, City of Woodcreek, Texas Water Development Board, Nature Conservancy of Texas, and the Guadalupe-Blanco River Authority. ●

For more information, contact Jason Pinchback from the Texas Stream Team at (512) 245-9148 or via email at jp30@txstate.edu.

Volunteer Spotlight –

Orange County Environmentalist Honored for Volunteer Efforts

by Robert Hankins, Orange County News (reprinted by permission)

Lockwood "Woody" Cox, environmental systems and biology teacher at Little Cypress-Mauriceville High, was named December Volunteer of the Month by Texas Stream Team, a network of volunteers and partners working together to gather information about the natural resources of Texas.

Woody Cox with some of his students at LC-M.

Cox and his students partner with the Sabine River Authority to monitor nutrients in Little Cypress Bayou. November marked the addition of a new parameter, *E. coli,* to the LCM sampling regime.

"We monitor the excess material being dumped into the bayou," said Cox, an LC-M teacher for 15 years. "A bayou can be unhealthy for many reasons. Either there's not enough rainfall, or the water doesn't flow well and in this case you have companies dumping waste material into it… The material is treated, but if it doesn't flow upstream, it concentrates in the area."

The class is designed to stay with students long after high school, from learning safety around chemicals and testing equipment, to cleaning up the litter in the bayous they test and through the Adopt-A-Highway program.

"It gives them an appreciation for their neighborhood," Cox said.

It's not uncommon to find crawfish bags left from parties in the bayou, and used hypodermic needles along the side of the road.

"Once we found a whole toilet, bowl and everything, dumped in the bayou. As the students get older, I hope seeing these things will make them think twice about littering because they'll remember, 'I know what it's like to clean up someone else's trash.'"

Cox, who recently completed his Master's degree in biology, added, "The experience of doing this class over the years has been fun, and the school district has been very supportive."

Established in 1991, Texas Stream Team is administered through a cooperative partnership between Texas State University, the Texas Commission on Environmental Quality, and the Environmental Protection Agency. ●

Editor's note: The original article appears on the Web at www.theorangecountynews.com/news/2007/1212/front_page/005.html.

Texas Stream Team

Volunteers of the Month

November
Sharon Slagle and Rick Ramke
Arroyo Colorado Watershed

December
Woody Cox
LC-M High School

January
Barbara Jacobson
Blanco River Watershed

February
Delores McCright
Texarkana College Earth Club

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

Mark Your Calendar!

Great North American Secchi Dip-in

For dates and details, please visit the Secchi Dip-in website at http://dipin.kent.edu/

Data Summary Report –

Guadalupe River Near Canyon Lake

by Jason Pinchback, Texas Stream Team

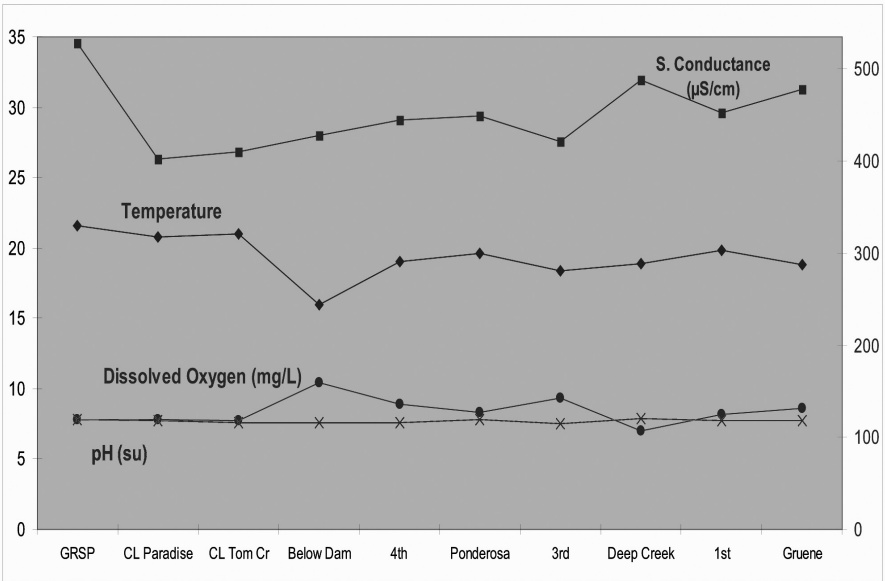
The People

A strong volunteer water quality monitor presence in the Guadalupe River watershed was a precedent established in the early 1990s with much activity from schools, individuals, and special interest groups alike. Now, as we ease in to 2008, the Lindheimer Master Naturalist group continues this tradition with a dedicated group of citizens actively monitoring several sites on the Guadalupe, Comal, and Blanco Rivers. The Lindheimer Master Naturalist (LMN) chapter initially trained and began monitoring at Guadalupe State Park in August 2004. Ernest Lee was their first water quality monitoring trainer, and the LMN chapter has hosted several trainings over the years.

Several times each year, Texas Stream Team staff review selected sites and complete a data summary report. These sites are usually chosen based on the amount of data, perennial flow at the site, current activity of the monitors, and specific requests by monitoring groups. The data summary reports typically include descriptive summary statistics, charts, tables, and narrative. In late 2007, LMN members David Boyland (data manager) and John Siemssen (monitoring coordinator) visited Stream Team headquarters in San Marcos to discuss data, sampling, and *E.coli*. During the meeting they expressed a need to better understand the information that has been collected and a desire to expand their sampling program to include *E.coli* data collection. In response to their request we completed a data summary report, scheduled trainings, and provided a presentation to the LMN group during their main monthly meeting at the Comal County Extension Service office.

The Data

The Stream Team Data Manager, Nimmi Karunarathna, queried the database to find all monitoring events that took place on the Guadalupe River, in and around the Canyon Lake, New Braunfels, and Guadalupe River State Park areas. In all, ten sites were assessed for aquatic life use concerns, and each of these sites had ten or more sampling events each. There was one site upstream of Canyon Lake and that was at the Guadalupe River State Park. There were two sites in Canyon Lake (Canyon Lake Hills/ Paradise Point and Tom Creek). Seven other sites are located between the Dam and Gruene, Texas.



All data combined: Average values for all parameters (sites arranged in order of upstream to downstream).

When assessing water chemistry data for aquatic life use concerns, one typically looks at the available data and applicable state water quality standards. In this instance, Stream Team volunteers collected dissolved oxygen, pH, specific conductivity, temperature, Secchi depth transparency, flow severity, and others. A total of 183 monitoring events took place from 2002-2007 at the ten selected sites. All values, except four (2%) low dissolved oxygen readings, were at or above the grab sample "aquatic life use" numeric criteria of 6.0 mg/L. At many locations, water temperature influences dissolved oxygen levels; as water temperature decreases, oxygen increases; when temperature increases, oxygen levels decrease. Specific conductivity, pH, temperature, and other data were all within acceptable range. There were limited or no data available to assess nutrients or pathogens issues at any of the sites. ●

Aquarena Center –

Summer Stewardship Academy

by Jane Moore, Aquarena Center

This summer, junior high school students from the greater San Marcos area will have the opportunity to become actively involved in helping to restore the San Marcos River by participating in Stewardship Academies at Aquarena Center. During these daytime service-learning programs, stewardship cadets will learn about the negative effects of invasive, exotic species and the importance of re-establishing a healthy balance of native plants. Students will obtain firsthand experience with the special emphasis on rare and endangered aquatic species habitat and how good stewardship is essential for basic human needs. They will also learn how good stewardship makes it possible to continue enjoying recreational activities like swimming, tubing, and scuba diving.

Participants will remove honeysuckle and elephant ears from Aquarena's wetlands boardwalk, hone their canoeing skills while collecting water hyacinth and water lettuce, and replant native species. Cadets will also participate in a trash cleanup and learn about using plants for erosion control along stream banks. Their hard work and stewardship efforts will be rewarded with various fun recreational activities.

Volunteers clearing water hyacinth from Spring Lake.

The Stewardship Academies are part of two grants recently awarded to the River Systems Institute at Texas State University–San Marcos. The Five Star Restoration Challenge Grant is a team effort including Aquarena Center, the National Park Service (NPS), the City of San Marcos, and several other important partners. Aquarena staff will provide technical support and oversee the restoration work that takes place along Spring Lake, as well as providing trained instructors for the academies.

AQUARENA
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The San Marcos River Foundation (SMRF) will instruct cadets and community volunteers on the proper way to remove exotic species. The San Marcos Lions Club, SMRF, and Texas State University work-study students will all help to provide volunteer labor in removing undesirable vegetation. The City of San Marcos will contribute toward obtaining native plants that will be nurtured in the nursery at Aquarena. The Environmental Corps of American Youthworks will instruct cadets and volunteers about erosion control and also provide skilled labor to help plant native species.

Additional funds for both the restoration efforts and stewardship academies are being provided by the NPS Challenge Cost Share Program. The NPS Rivers, Trails and Conservation Assistance Program will oversee overall administration of the restoration project. Combining funds from both grants with technical expertise and efforts of exceptional partners will make it possible to reach the common goal of recruiting and preparing good stewards to take care of the valuable aquatic resources we all share. ●

For more information about the Stewardship Academy Summer Day Camps, please visit www.aquarena.txstate.edu/Educational-Tours.html.

Special Project Areas –

TMDL Update

by Eric Mendelman, Texas Stream Team

The last several newsletters have featured highlights of Texas Stream Team activities where waters are impaired. These TMDL (Total Maximum Daily Load) project areas include the Arroyo Colorado in the Rio Grande Valley, Oso and Petronila Creeks near Corpus Christi, and Adams and Cow Bayous in Orange County. This summary provides a quick recap of 2007 activities and looks ahead at 2008.

Petronila and Oso Creek

This area has two priority issues that Texas Stream Team has focused on: bacteria impairments and illegal dumping. To address these issues, we kicked off 2007 by partnering with the Coastal Bend Council of Governments (CBCOG) to hold a regional meeting and several nonpoint source education sessions in schools. CBCOG's solid waste program supported our efforts to educate folks not only about water quality and nonpoint source pollution, but also about litter.

Watershed model demonstration at a Corpus Christi elementary school.

Here are a few of the highlights:

- Led an intensive three-day *E. coli* monitoring training at the Texas A&M Corpus Christi Teaching Environmental Sciences (TES) program.
- Promoted Texas Stream Team to approximately 200 teachers attending the Teacher Resource Extravaganza at the History and Science Museum.
- Hosted a Watershed Protection Meeting entitled "Bays Roundtable on Bacteria and Solid Waste."
- Toured the Tierra Grande colonia (an unincorporated neighborhood with inadequate water and sewer service) to identify ways that monitoring can help these communities.
- Conducted nonpoint source (NPS) pollution education workshops at two schools.
- Loaned an NPS model to the Harte Research Institute for Gulf of Mexico Studies, which will support NPS education in area schools.

In 2008, we are designing grant projects with the Harte Institute, the Corpus Christi Independent School District, Texas Amphibian Watch, and Project WILD Aquatic. In conjunction with this effort, we plan to develop curriculum materials specifically for this project area, emphasizing the unique characteristics of the Oso and Petronila systems, the issues associated with their respective TMDLs (as well as other concerns such as litter), and what students, parents, and teachers can do to make a difference.

Monitor training in the Arroyo Colorado watershed.

Arroyo Colorado

The Arroyo Colorado has several water quality issues that are being addressed by a Watershed Protection Plan. Dissolved oxygen and bacteria are two of the main issues addressed by the Texas Stream Team volunteer monitoring program. In 2007, we trained 31 monitors who collected data on six sites, conducted several Watershed Protection/NPS Education Workshops focusing on public outreach, coordinated a Watershed Protection Meeting, facilitated a TES course at University of Texas-Pan American, and collaborated with several organizations including: Texas State Technical College, University of Texas at Brownsville, Idea Preparatory Academy, Arroyo Colorado Partnership, Master Naturalists, Los Caminos Del Rio, and the International Museum of Arts and Sciences. In 2008, Texas Stream Team will continue its support for volunteer monitors and focus on training individuals at the local level to provide training and quality control support.

Orange County

Adams and Cow Bayous in Orange County are impaired by bacteria, low dissolved oxygen, and pH. In 2007, Texas Stream Team initiated

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TMDL Update

(Continued from Page 7)

efforts to develop a monitoring program and to establish a regional NPS education program at the Shangri La Nature Center.

The program conducted two volunteer monitoring training session, one in conjunction with the Lamar University TES. A key partner that emerged from these efforts was Woody Cox, a teacher at Little Cypress-Mauriceville High School in Orange. Woody incorporates Texas Stream Team monitoring in his classroom activities and assisted in the Orange monitor training session.

The program also hosted a regional meeting at the West Orange Community Center that was attended by several key partners, including: the Sabine River Authority, Texas Parks and Wildlife Department, Texas State Soil and Water Conservation Board, Orange County, Shangri La Nature Center, and representatives of the Natural Areas Protection Association who have identified NPS education events and venues for 2008.

On the monitoring front, we will train certified monitors to gather *E. coli* data and work with Sabine River Authority to identify sites that support and enhance TMDL implementation. ●

Field trip at the Shangri La Nature Center, Orange County.

Resources for Teachers –

New Curriculum Under Development

by Julie Tuason, Texas Stream Team

During the last week of January, Texas Stream Team volunteer monitor and retired science teacher Jackie Mattice tested a new, week-long curriculum unit on sedimentation that she has been developing for use in middle and high school science classrooms. Under the auspices of Principal Dee Howard, teacher Tonya McQuaid of Wimberley Junior High School and her fifteen sixth-grade environmental science students viewed PowerPoint presentations, performed daily lab activities, and completed accompanying review worksheets.

Jackie Mattice with a sixth grade science class in Wimberley.

The sedimentation unit covers soil characteristics and their origins, how soils get into the water, the harmful effects of sedimentation on aquatic ecosystems, why sedimentation is considered a nonpoint source of pollution, and how we can minimize the soil that gets into the water. We hope to have the unit ready for distribution by the fall of 2008. A second curriculum unit, focusing on bacteria, is also being planned.

Texas Stream Team offers free curriculum for teachers, downloadable as pdf files from our website at *www.txstreamteam.rivers.txstate.edu/Publications/Curriculum.html*. Currently available are: "Water Quality Monitoring Curriculum Companion," "Conducting a Watershed Survey Curriculum Companion" (also available in Spanish), "Surface Water Quality Data Interpretation Workbook and Curriculum Companion," and "Intermediate Student Guide to Water Quality Monitoring." ●

For more information on Texas Stream Team's resources for teachers, contact Dr. Julie Tuason, Environmental Education Coordinator, at jt07@txstate.edu or call (512) 245-7470.

Sediments

(Continued from Page 2)

Human activities – including urbanization, agriculture, forestry, and mining, to name a few – can remove a landscape's natural resistance to erosion. For example, sediment concentrations in urban runoff occur primarily from soil erosion and runoff from construction sites. Areas under construction have been shown in some studies to produce 10 to 100 times more sediment than is found in otherwise comparable rural or natural areas.

Agricultural activities consist of removing an area's natural vegetation and introducing a selection of domesticated and specialized crops. Depending on the agricultural methods used, the act of removing the native vegetation and baring the soil to make it receptive to planted crops can increase the soil's vulnerability to erosion. The soil's top layer is most vulnerable to erosion, and this is also often the soil's most fertile layer, being richest in nutrients. Loss of the topsoil often requires the use of more fertilizers to compensate for reduced natural fertility.

The downstream effects of soil erosion can be severe. Increased sediment in runoff may cause significant biological, chemical, and physical changes in receiving waters. Changes can include loss of water clarity, decreased light penetration through the water column, clogging of gills and filters of aquatic organisms, and aquatic habitat degradation particularly for benthic communities (Figure 2).

In addition, waterways filled with deposited sediments have a reduced capacity to transport floodwaters in times of high flow. This is a frequent problem in urban areas where construction releases large amounts of sediment, which are then deposited in storm drains or natural channels. Once sediments are deposited, removal and maintenance can be costly.

In Texas, water quality degradation from sediments is an unfortunate reality. Many Texas Stream Team monitors have seen the effects firsthand. Fortunately, sedimentation can be controlled with land management strategies designed to keep soils and associated pollutants from ever entering the waterways. Many responsible companies, farmers, cities, and community members have effectively reduced sedimentation in their area through land management. Stay tuned for some sediment reduction techniques. ●

Check it Out!

New Texas Stream Team Website

by Terry Wendland, Texas Stream Team

In coordination with Texas State University's Instructional Technology Department, Texas Stream Team recently came on board with the required format for websites affiliated with Texas State.

Texas Stream Team staff Terry Wendland and Heidi Moltz received training on the new Content Management System software in late October 2007. After approximately two weeks of intensive work and edits, the Texas Stream Team website launched November 1, 2007.

The website features several new pages: the Spring Lake Activities page, the Volunteer Spotlight page, and the TMDL page. The Spring Lake Activities page features information and activities that take place at Spring Lake and Aquarena Center. The Volunteer Spotlight page provides the Texas Stream Team program a venue to recognize and congratulate a "Volunteer of the Month" for their continued efforts. It also recognizes one year, five year, and ten year anniversaries of volunteer monitors. The TMDL page offers information on TMDLs statewide and has sub-pages that focus on project areas in which Texas Stream Team will be focusing program efforts.

All pages from the original Texas Stream Team website were updated and expanded to create an eye-pleasing, informative format.

Texas Stream Team has received many compliments on the new format, user-friendliness, pictures, etc., from both within the university and statewide. To visit the website, go to *www.txstreamteam.rivers.txstate.edu* and enjoy! ●

Oso Creek and Oso Bay –

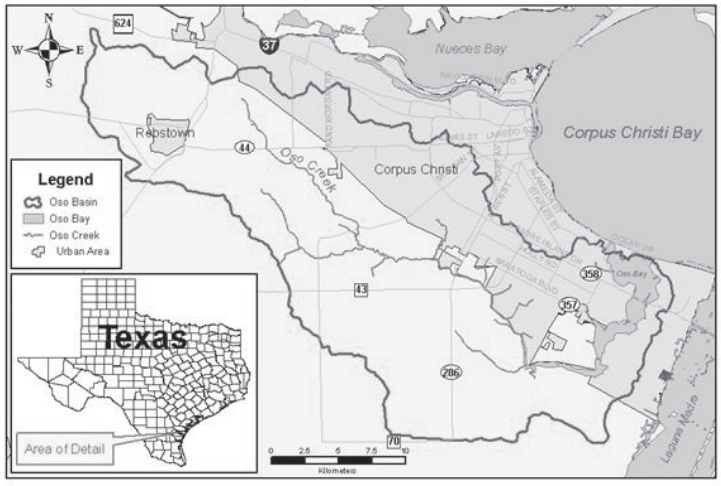
Bacteria Impairments in a Coastal Watershed

by Larry Koenig, Texas Commission on Environmental Quality

The Oso Creek and Oso Bay watershed covers approximately 235 square miles in Nueces County, Texas. Oso Creek begins near the City of Robstown and flows about 25 miles southeast to Oso Bay in the City of Corpus Christi. There are about 14 miles of non-tidal creek flowing into 11 miles of tidal creek before discharging to Oso Bay. Oso Bay is a shallow tertiary bay of about 3,000 acres (4.7 square miles) connected to Corpus Christi Bay.

Topographically, the Oso basin is flat to gently sloping, on remnants of marine terraces deposited approximately 1 to 1.5 million years ago. The total change in elevation within the basin, from northwest of Robstown to Oso Bay (about 25 miles), is about 92 feet, making an overall slope of about 0.0007 ft/ft – which means it is literally "flatter than a pancake."

Geologically, the watershed lies on the Pleistocene Beaumont Formation, which is largely made up of interdistributary muds, abandoned channel-fill muds, and fluvial overbank muds, all of low permeability. Some areas of the basin exhibit the low to moderate permeability of meander belt, level, crevasse splay and distributary sand deposits, which may be visible as lighter colored areas in fields or on aerial photos.



Map showing location and extent of the Oso Creek watershed.

Near the Laguna Madre, there may be more recent sand dunes or other types of wind-deposited sands. Channel cuts along Oso Creek and around Oso Bay provide the only visible elevation changes. Brushy woodlands form narrow strips along and within stream channels.

Archeological excavations near Oso Bay indicate that Late Archaic hunter-gatherer groups occupied the area at least 2,000 years ago, and were performing ceremonial burials. Native Americans with similar lifestyles still occupied the area when the first European explorers arrived during the 16th and 17th centuries.

The word "oso" means bear in Spanish. It's not clear whether there were actually bears in the area, but someone thought they saw "Bigfoot" back in 1972. It is known that the native human inhabitants were often heavily tattooed and wore little else, a style that might sometimes be observed to this day.

The Oso watershed supports notable populations of birds of many types. Big, spectacular birds like pelicans, roseate spoonbills, and great blue herons are seen year-round, and large populations of winter migrants float and fly all over the watershed. The northwesterly corner of Oso Bay, often called the Blind Oso, has become a well known birding area, due to a large rookery and a convenient boardwalk in the Hans Suter Park. Numerous birds congregate in that area to use the wetlands, shallow bay water, and constant freshwater inflow from a nearby wastewater treatment facility.

Ironically, the large bird population appears to be the primary reason that bacteria concentrations in the Blind Oso sometimes exceed levels deemed safe for contact recreation. Birds may also contribute significantly to bacteria concentrations in other parts of the watershed – that possibility will be studied during 2008-2010.

The level nature of the terrain is suitable for large-scale agriculture. Spanish settlers were raising large herds of cattle in the area by the late 1700s. Today, most of the Oso watershed (approximately 63 percent) produces row crops. Somewhere in the range of 13 to 16 percent of the Oso watershed is classified as an urban land use today – some of the area within Corpus Christi city limits is still not developed to an "urban" condition.

In order to facilitate agriculture, transportation, residential development, and other modern uses of the watershed, drainage has been improved by constructed channels in the upper reaches of Oso Creek and in the tributaries. Both agricultural and urban land uses crowd very near the improved drainage channels, leaving little buffer between disturbed soils and the streams.

The combination of intensive land use by large numbers of people with more rapid drainage of storm runoff affects water quality – human activities introduce pollutants that were absent before; rapid drainage facilitates washoff of pollutants and erosion of land surfaces or stream channels. Storm runoff from agricultural and urban areas is a major source of periodic bacteria loading to the waterways.

Human occupation and recreation in the watershed also contribute bacteria loads that affect water quality when there is no storm runoff. Leaking or inadequate septic systems, uncontrolled pet or livestock waste, illegal dumping, and other day-to-day activities contribute bacteria loads that are relatively small compared to storm runoff loads, but still have a major influence on bacteria concentrations at the times and places where contact recreation is most likely to occur. Analyses indicate that these small but continuous "dry-day" human sources are the most important to reduce in order to address concerns about the safety of contact recreation.

Both Oso Bay and Oso Creek are usable for contact recreation. At some times, and some places, any natural water body may exceed the contact recreation bacteria standards, which are the same standards applied to chlorinated swimming pools. Even chlorinated pools or spas present some low level of risk.

Basic common-sense precautions that should be observed while swimming in any water, chlorinated or natural, will minimize the risk of using Oso Bay and Oso Creek for recreation. Don't be scared to use the creek or bay, be careful.

Here is a list of some basic precautions for recreation in natural water bodies. If you have children to manage, tell them these things and be aware of their behavior.

- Avoid letting water get in your mouth – if it does, spit it out. Beach sand or creek bed sediment also has bacteria in it, probably more than the water does.
- Wash your hands before putting them in your mouth, or using them to eat. If you can't wash, handle snacks by the wrapper and keep spouts of water bottles clean.
- Avoid swimming after heavy rains, especially near storm drain outlets. Water that is turbid or cloudy with dirt will have much more bacteria or other dangers in it.
- Look (and sniff) for trash, oil slicks, concentrations of bird droppings, discharge pipes, or other signs of localized contamination. If present, it would be better to swim elsewhere.
- If you tend to get ear or eye infections, consider using earplugs or swim goggles. If you have open skin cuts or scrapes, clean them with soap and water after swimming.
- Consider wearing shoes while swimming or wading. Broken glass, metal, or other debris may cause injuries that could increase the risk of bacterial infections. Plus, cut feet are unpleasant even without bacterial concerns. ●

Additional information about minimizing the risks of water recreation activities can be found online at www.cdc.gov/healthyswimming/beaches_rivers.htm and www.cdc.gov/healthyswimming/fact_sheets.htm.

Congratulations to Our New Water Quality Monitors!

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Valerie Baker
Autumn Barker
Chris Battershell
Karin Blain
Greg Bonds
John Borden
Barbara J. Bowles
Patrick Bowles
Sylvia Bradburg
Brittany Broussard
Heather Ann Brown
Bill C. Burgin
Shane Burns
Marguerite Burtis
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Benjamin S. Colvin
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Kandice Cruise
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Daniel Drake
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Scott Etzel
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Melissa Masterson
Valenta Mathews
David Matlock
Florence Mayhall
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Edward Meyer
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Peggy Wright
Irene Yodsis
Tamara Young

Contact Us

Texas Stream Team
Texas State University-San Marcos
The Landing
601 University Drive
San Marcos, TX 78666-4616
Toll-free: (877) 506-1401
Web: www.txstreamteam.rivers.txstate.edu

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Texas State University-San Marcos
Texas Stream Team
The Landing
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San Marcos, TX 78666-4616
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