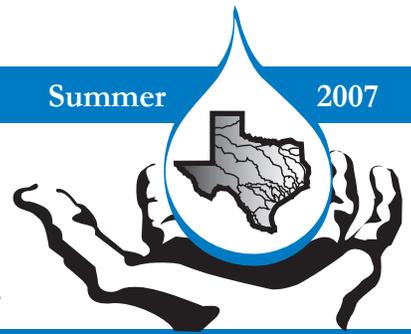


# Texas Watch



River Systems Institute, Texas State University-San Marcos

EPA Region 6

TCEQ

## Nonpoint Source Pollution – Tools for Finding the Source and Solving the Problem

by Heidi Moltz, *Texas Watch*

*Editor's Note: Heidi Moltz is Texas Watch's newest staff member. In this article, she shares her scientific expertise about the latest technologies available for assessing non-point source pollution. (For more about Heidi, see page 3.)*

Stormwater runoff washes pollution from the land like sediments, nutrients, toxics, and pathogens into our waterways when it rains. Human land uses in physically vulnerable areas generate a significant amount of these nonpoint source pollutants. Identification of critical pollutant-generating land areas is essential for control of non-point source pollution (NPS) due to the time and financial resources that would be required for Best Management Practice (BMP) implementation along all waterways. Locations of critical areas depend on a multitude of factors, including (but not limited to) land uses, soil characteristics, slope, and hydrologic variables. For example, agricultural areas are prone to erosion from tilling. As the slope of the land increases, the vulnerability to water pollution due to erosion of the soil, fertilizers, and pesticides increases as well. Identification of vulnerable areas is crucial to the success of an NPS pollution management strategy.

- Tools for the identification of areas for the management of NPS are now more comprehensive than ever.
- With the development and refinement of Geographic Information Systems software and the multitude of process-based modeling programs like the Soil and Water Assessment Tool (SWAT) and Hydrological Simulation Program–Fortran (HSPF), watershed planners and hydrologists alike have a wide array of technology at their fingertips for pollution control. As the field advances, the integration of these tools allows for simulation of spatially distributed hydrologic and pollutant data.

## World Water Monitoring Day

***New Date Starting in 2007!***

World Water Monitoring Day is now scheduled for September 18 because water bodies in colder climates are often frozen solid by October.

Visit [www.worldwatermonitoringday.org](http://www.worldwatermonitoringday.org) for details.

Choosing the appropriate assessment tool requires delineating the geographic area of interest and defining project goals. Tools exist for analysis at scales ranging from one corn field of a farm to the entire Mississippi River Basin, which spans many states. Project goals will also play a key

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# Tools for Assessing NPS

(continued)

role in determining what types of analytic tools will be useful. Goals might include critical area identification, most efficient BMP location identification and impact, and meeting TMDL (Total Maximum Daily Load) objectives, among many other possibilities.

For general identification across large areas using readily available data, Geographic Information Systems (GIS) is an ideal tool. Moreover, GIS



Algal bloom resulting from NPS pollution.

software is a commonly used tool that produces easily understandable, spatially distributed results. One method for the identification of vulnerable areas over broad geographic extents using GIS is to use water quality risk assessment techniques. Using standard hydrologic equations for runoff and erosion, it is possible to develop indices of NPS pollution risk across a large area. Areas at

high risk for runoff and erosion are given a high priority for NPS pollution control because pollutants transported to the waterways during rain events can be adsorbed to (attached to the outside of) soil particles, or dissolved or suspended in the stormwater runoff. Identification of areas that are highly vulnerable to these processes using GIS can be used to indicate areas likely to produce nonpoint source pollution.

For a subwatershed unit, such as a farm or field requiring detailed hydrologic analysis, a process-based model produces quantitative hydrologic and pollutant loading data. Although the time, money, and expertise necessary to fully calibrate such a model are extensive, the efforts can pay off in the end for many projects. Products such as load reductions for BMPs, flow alterations over time, erosion prevention, and effects of land use changes can be estimated through the use of detailed, process-based models.

Land management strategies can be developed for NPS pollution prevention with an understanding of the physical processes driving nonpoint source pollution and the diverse array of modeling tools available for identifying critical areas. The biophysical science and technical tools of diffuse pollution management, however, are not sufficient for its control. Public education and community involvement that inspires protective public policy and a commitment to improving the quality of water, our most valuable natural resource, is an essential ongoing process in the prevention of nonpoint source pollution. ●

## TEXAS WATCH

2007, Vol. 8, No. 3

The mission of Texas Watch 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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### Subscriptions:

The purpose of the Texas Watch newsletter is to disseminate information about nonpoint source pollution and to encourage and facilitate 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](mailto:texas_watch@geo.txstate.edu). To receive the newsletter by email, go to the Texas Watch 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 Watch at the postal address listed on the back page or submit them via email at [texas\\_watch@geo.txstate.edu](mailto:texas_watch@geo.txstate.edu).

If you wish to reprint any material published in the Texas Watch newsletter, please notify the editor of your intentions and submit a copy of the final publication.

Down on the Bayou –

# The Orange County TMDL Project

by Ward Ling, Texas Commission on Environmental Quality

The small alligator—“small” by bayou standards is anything less than 8 feet long—is keenly aware of our presence. We attempt a closer look, but as the boat approaches zoom-lens range, the gator slowly sinks out of sight, leaving only a swirl of coffee-colored water to indicate where it was. A few jokes are made about going swimming, then we make our way farther up the oxbow, past large bald cypress trees and a multitude of different birds, the names of which I don’t know. It is midmorning and the day is already hot and humid. Today, I am part of a field sampling crew and will be on the water from sunup to sundown collecting water samples and field measurements. We will swat a few mosquitoes during the day, but they are nothing compared to the clouds of the pesky critters that will descend on the crew as night falls. It will be a long, hot day on Cow Bayou as part of another intensive survey for the Orange County Total Maximum Daily Load (TMDL) Project.

The day before, I was up at the crack of dawn driving all over Jasper, Newton, and Orange counties, retrieving water samples collected by boat crews and waste water treatment facility (WWTF) operators. My job was to transport these samples to the Sabine River Authority of Texas Environmental Services Laboratory. The only difficulty of the day was trying to navigate using a road map that, as it turned out, didn’t list all the necessary small county roads and farm-to-market roads that I would need. However, that was no problem since small East Texas towns are full of helpful folks who always got me back on the road heading the right way (when I would stop for directions).

Dawn of the third morning finds me in a truck driving to road crossings to, again, collect water samples and field measurements from tributaries of Cow Bayou. I am thankful for the air-conditioned vehicle and padded seat, and

*(Continued on page 6)*

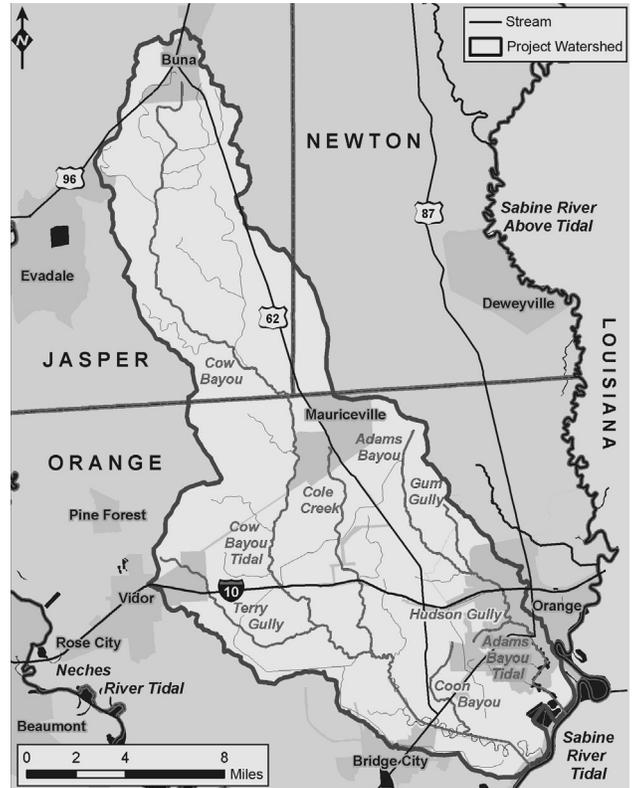
## Welcome, Heidi Moltz!



Heidi Moltz began working at Texas Watch in April 2007 as the program’s new Statewide Volunteer Coordinator. Heidi’s area of interest and expertise is identifying critical areas for nonpoint source pollution management and controlling pollution using land management techniques. Originally from

Midlothian, Texas, Heidi received her undergraduate degree from the University of Texas at Austin. After completion, she moved to the Midwest to pursue her

- Master of Science in water resources management from the University of Wisconsin at Madison. Heidi’s
- Master’s research focus was on the design and implementation of vegetative riparian buffers to control
- agricultural pollution.
- Heidi returned to Texas in 2005 to pursue doctoral studies in the aquatic resources program at Texas State
- University–San Marcos. Our newest team member has
- professional experience working for the Texas Water
- Development Board, the Texas Commission on Environmental Quality, the City of Austin Water Conservation Department, Texas Industries Environmental
- Division, and the University of Wisconsin. •



# Welcome New Arroyo Colorado Watershed Monitors

by Heidi Moltz, Texas Watch

Texas Watch monitoring in the Arroyo Colorado Watershed is part of the Watershed Protection Plan for the Arroyo Colorado. The Protection Plan is “designed to address impairments and concerns identified in the 2004 Texas Water Quality Inventory and 303(d) List.” On Saturday, May 19, a group of 17 people interested in the health of the Arroyo Colorado watershed completed Texas Watch’s Phase I and Phase II water quality training in Harlingen, Texas. Phase I took place in a Chemical Technology classroom at Texas State Technical College. Phase II took place at the Ramsey Park World Birding Center, a beautiful park with a diverse array of plants and wildlife. Phase III for the group was held the last weekend in June. On that weekend, another Phase I and II training was held in the Arroyo Colorado watershed to continue expanding monitoring efforts in the Basin. The next Phase III training will be held in mid-September.

Participants for the trainings came from the Rio Grande Valley Master Naturalists, Texas State Technical College, Hidalgo High School, Los Caminos Del Rio, Texas State College, and University of Texas at Brownsville. Partners for this event were the Rio Grande Valley Master Naturalists, Texas State Technical College, and International Museum of Art and Science with assistance from TCEQ Harlingen. State and federal sponsors for this event included Texas Commission on Environmental Quality and U.S. Environmental Protection Agency (EPA) Region VI 319 grant, with assistance from a River Systems Institute and an EPA bacteria sampling grant.

A thorough environmental education presentation was given at the trainings, including a watershed and non-point source pollution presentation, background and training for *E. coli*, dissolved oxygen, conductivity, pH, Secchi depth, and in-field sampling techniques. An unprecedented amount of Texas Watch equipment was supplied for continued use by the Arroyo Colorado monitors, demonstrating Texas Watch’s commitment to the success of this project. The group was pro-

vided with aquatic vegetation guides, steep bank water sampling equipment, customized GIS mapping materials, several fully stocked Texas Watch monitoring kits, and *E. coli* incubators and monitoring supplies. This equipment will allow this newly trained group to monitor water quality for aquatic life and contact recreation conditions.

Several monitoring locations were identified, including sites in the upper, middle, lower, and Laguna Madre portions of the watershed. Monitoring will take place on the main channel of the Arroyo Colorado as well as on tributaries and irrigation canals. One volunteer from the training will also be monitoring the Rio Grande. Additional monitoring sites on the Arroyo Colorado and its tributaries will be identified as the newly trained monitors select their locations.

Together, Texas Watch and the volunteers will move forward to assess the health of the Arroyo Colorado. For more information on the Total Maximum Daily Load (TMDL) project areas, specifics of the Arroyo Colorado project including maps and monitoring locations, and to find ways you can get involved, visit the Texas Watch TMDL Web page at [www.texaswatch.geo.txstate.edu/tmdl.asp](http://www.texaswatch.geo.txstate.edu/tmdl.asp).



Texas Watch’s newest recruits in the effort to improve water quality in the Arroyo Colorado watershed came together in Harlingen in May to be trained as monitors.

# AQUARENA

TEXAS RIVERS CENTER • SAN MARCOS, TEXAS

Fall Educational Programs –

## A Field Trip on a Glass-Bottom Boat

by Sonja Mlenar, Aquarena Center

Summer is winding down and the 2007-2008 school year is about to begin. What better time to take a field trip! Aquarena Center in San Marcos specializes in interactive tourguide-led environmental educational programs. During an Aquarena Center field trip, students gain a greater appreciation of water conservation, pollution prevention, endangered species and threatened habitats, and the culture of the area. Tours range in length from 30 minutes to all-day programs for groups of all ages. Our programs are customized to fit the needs of your class.



Come ride the Glass Bottom Boats and see the second largest springs in Texas and the plants and animals that rely on their cool, clear water.

You may choose from a variety of fully guided activities such as a glass-bottom boat ride, an aquarium tour, a walk through the wetlands, the Texas Rivers Center Exhibit, and interactive activities. Interactive activity options include Bug Picking, Wetlands Bug Bingo, Frog Food Chain Tag, All the Water in the World, Teepee Building, Cattail Bracelet-making, and many more. Please visit our Web site at [www.aquarena.txstate.edu/1tours.html](http://www.aquarena.txstate.edu/1tours.html). All tours require a two-week advance reservation. For more information or to book a tour, please call (512) 245-7540. ●



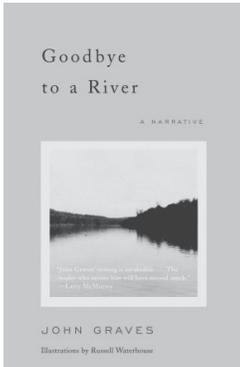
Students will peer through the glass of our 5,400-gallon tank during the aquarium portion of the tour. While in the aquarium, students will learn about the endangered species that live in this critical habitat and what we can do to help them.

### Do You Want to Save the Earth? Subscribe to the Texas Watch E-Newsletter!

The Texas Watch E-Newsletter is identical to the paper version. We send it out to your email address as a PDF (Portable Document Format) file. Help us to save precious energy and resources by subscribing to the E-Newsletter. To switch your subscription to the electronic version, go to [www.texaswatch.geo.txstate.edu](http://www.texaswatch.geo.txstate.edu), type in your name and email address, and click "Subscribe."

## 2007-2008 Common Experience – The Water Planet: A River Runs Through Us

from Texas State University-San Marcos



**Primary Text:**  
*Goodbye to a River,*  
by John Graves

Beginning upon their arrival on campus this August, every entering freshman and transfer student at Texas State University-San Marcos will be learning about the importance of water. This year's theme for The Common Experience program is "The Water Planet: A River Runs Through Us." The Common Experience is a year-long initiative of Texas State University-San Marcos designed to cultivate a common intellectual conversation across the campus,

to enhance student participation in the intellectual life of the campus, and to foster a sense of community across our entire campus and extended community.

As a theme for the Common Experience, the subject of water has particular relevance for our university. The unique, spring-fed San Marcos River that runs through campus is a constant visual reminder of the many dimensions and roles that water plays in our lives. The nexus of the Common Experience parallels this literal flow: it fosters students' confluent thinking where discovery in one area will lead them to discovery in another.

Water is a salient focus in science, law, history, anthropology, economics, political science, and international relations. Yet our creative imagination is equally compelled by water's beauty and allure. This wonderment unfolds into aesthetic expression in art, music, poetry, literature, religious rite, and cultural ritual, all awash in the world of ideas.

Clearly streaming through so many realms, the Common Experience theme on water can galvanize interdisciplinary conversation, cultivate learning and introspection, and inspire a collective stewardship of this most precious global gift within our university family. Visit us at ([www.txstate.edu/commonexperience](http://www.txstate.edu/commonexperience)).

## Orange County TMDL

(Continued from page 3)

the reprieve from the little flying bloodsuckers. The field crews and I chalked up another of the eight intensive surveys planned for this TMDL project.

### Why Put Ourselves Through That?

Adams Bayou and Cow Bayou were identified as impaired in the 2004 Texas Water Quality Inventory and 303(d) List. Concentrations of dissolved oxygen do not support the aquatic life use in eight water bodies, and concentrations of bacteria do not support the contact recreation use in eight water bodies. In one, there is an impairment to the general use due to low pH. The total number of impairments is seventeen—in just nine water bodies. The Texas Commission on Environmental Quality (TCEQ) initiated a Total Maximum Daily Load (TMDL) project for these waterways in Orange County to identify the causes of the impairments. The project's goal is to determine what reduction in pollutant load is needed to get the bayous back to a healthy state.

Adams Bayou, Cow Bayou, and their tributaries are a mixture of above-tidal and tidally influenced bayous. Adam Bayou and Cow Bayou are unique water bodies because they do not have a conventional flow pattern like most perennial streams. Negative flow, or reversing flow, has been observed and recorded in the bayous due to the tidal influence. This alternating forward-reverse flow action slows the overall travel time considerably, further compounding the complexity of assess-

*Mark Your Calendar!*

## Texas Watch Fall Regional Meeting

Rio Grande Valley  
September 22, 2007  
9 a.m. to 3 p.m.

See [www.texaswatch.geo.txstate.edu](http://www.texaswatch.geo.txstate.edu)  
for location, as well as information on  
other fall events.



This railroad bridge over Cow Bayou is a familiar landmark to citizens living in the watershed.

ing impairments to the bayous. The lower portions of both bayous have been channelized and dredged for navigation, creating numerous oxbows in what were formerly more sinuous natural channels.

### Field Time

In order to fully develop a water quality model, a data collection effort was conducted. Two 48-hour intensive surveys were performed on the Cow Bayou system and two on the Adams Bayou system, to provide new data for calibration and verification of the models. Two rainfall sampling events for each system were also conducted, and sediment oxygen demand was measured at several sites.

### So What is Causing the Problem?

According to the draft TMDL report, the sources of pollution contributing to the impairments in Adam Bayou, Cow Bayou, and their tributaries are a combination of point and nonpoint sources. Potential sources include failing onsite sewage facilities, waste water treatment facilities, and nonpoint pollution.

### How Do We “Fix It”?

The Orange County TMDL project has benefitted since the project was initiated by having a very active stakeholder group. Continuing the strong stakeholder involvement, the development of a workable Implementation Plan is on the near horizon. The stakeholders have already had their first implementation planning meeting, and look forward to “fixing the problem.” The result will be the improvement of water quality in these unique East Texas bayous. ●

## Orange County TMDL and Texas Watch

by Eric Mendelman, Texas Watch

At the Orange County Steering Committee meeting on May 22nd, members of the Stakeholder Workgroup encouraged Texas Watch to contact educators at local colleges in order to develop ongoing sampling programs.

The approval of the new Texas Watch *E. coli* method presents the possibility of monitors collecting bacteria data that could be used to measure progress in the implementation of Total Maximum Daily Load (TMDL) pollutant reduction targets. The suspected presence of

high bacteria levels in the stormwater systems in Orange County is of particular concern. The Texas Commission on Envi-

For more information on the Orange County TMDL Project, go to [www.texaswatch.geo.txstate.edu/tmdl.asp](http://www.texaswatch.geo.txstate.edu/tmdl.asp).

ronmental Quality (TCEQ) TMDL Project Manager confirmed with Texas Watch that volunteer monitoring at selected stormwater outfalls would provide useful information. Texas Watch will work to identify stable and consistent partners to be trained to conduct the needed sampling. Possible sources of monitors include: Lamar University at Orange, the Boy Scouts, Master Naturalists groups, Shangri-La Education Center associates, and other motivated stewards that Texas Watch identifies in the course of its outreach activities.

On July 18 and 19, Texas Watch participated in the “Teaching Environmental Science” course held at Lamar University. On July 18, information about the Orange County TMDL was shared, along with information about the Texas Watch Program. On July 19, Texas Watch joined course participants in a tour of the Shangri-La Education Center. This center has been under construction due to damage from Hurricane Rita. This tour will orient Texas Watch to the facility and its staff in preparation for increased collaboration this fall. ●

# Congratulations to Our New Water Quality Monitors!

Ember Alonzo  
 Robert Archer  
 Kimberley Auerback  
 Jarrod Azpoardi  
 Meagan Azpoardi  
 Diann Ballesteros  
 Donna Berry  
 Walter Berry  
 Erin Bieberbach  
 Tyler Bohlman  
 Chase Brown  
 Lauren Burrus  
 Noemi Colmenero  
 Dylan Dean  
 Eric Ellman  
 Jackie Field  
 Christina Flores

Kyra Frost  
 Yuridia Patricia Gandy  
 Zack Giberson  
 Conner Green  
 Sam Heaton  
 Robert Hernandez  
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 Suzie McKelvey  
 David Moulder  
 Mary Helen Murray  
 Lea Paulin

Kamala Platt  
 Rick Ramke  
 Max Ramsey  
 Annette Rosa  
 Sophia Rossell  
 Hayley Serafino  
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