

The Water Monitor



Texas Commission on Environmental Quality- Monitoring and Assessment Section

Welcome to *The Water Monitor*, a quarterly **online** newsletter focusing on issues related to monitoring, evaluating, and protecting surface water quality.

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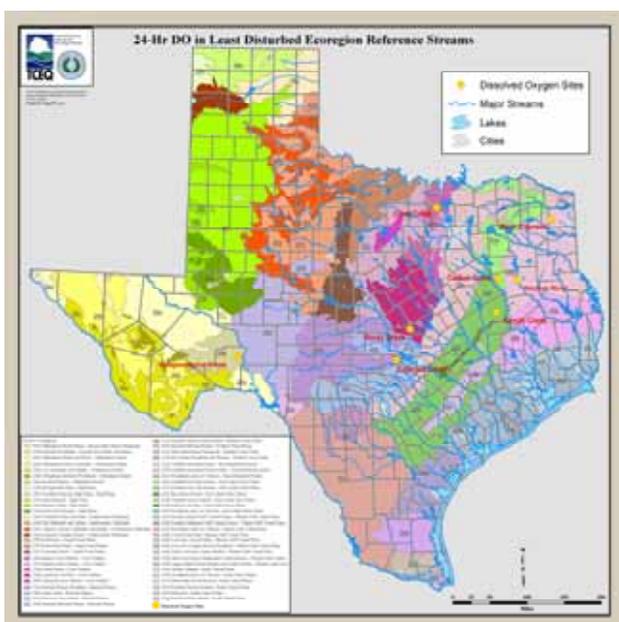
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24-Hour Dissolved Oxygen Dynamics in Minimally Impacted Streams

By Bill Harrison, TCEQ Surface Water Quality Monitoring Program

Defining realistic water quality standards for impacted water bodies can be challenging. Originally, an upstream-downstream approach was used. However, the validity of using an upstream control site which is affected by pollution or habitat modifications to establish attainable conditions is questionable. To address this issue, the TCEQ undertook an effort in the early to mid 1980's to develop a more effective approach to establishing attainable conditions for Texas streams. Studies such as *An Assessment of Six Least Disturbed Unclassified Texas Streams* (Twidwell and Davis 1989) and the *Texas Aquatic Ecoregion Project* (Bayer et al., 1992) established the utility of the ecoregion approach, which utilizes carefully selected minimally impacted streams within the same ecoregion as water quality reference sites to estimate attainable conditions. These studies identified minimally impacted reference streams in 11 of the 12 ecoregions found in Texas. Streams with watersheds containing no urban development, no point sources of pollution, no channelization and no atypical nonpoint sources of pollution were identified as candidate reference streams.

Multiprobe data loggers have been deployed at minimally impacted streams located in three of 12 Level III Ecoregions (ER) since 2004. The ecoregions included in this project are South Central Plains (ER 35), Western Gulf Coastal Plains (ER 34), and Edwards Plateau (ER 30). On each deployment, the data loggers collect and store data on dissolved oxygen, pH, temperature, and conductivity over a 24-hour period. The data will contribute to a better understanding of diel patterns, variation over the index period, and allow for comparisons between the warm and cool seasons, for these parameters. These data can then be used to better define regional expectations for these parameters which have several potential applications, including water quality standards development.



Information on this and other projects can be found on the Coordinated Monitoring Schedule website at <http://cms.lcra.org/>. Click on the "Special Projects" button at the top of the page.

Aquatic Life Monitoring on the Brazos River

By Jack Davis, Brazos River Authority

Over the past five years the Brazos River Authority (BRA) has conducted aquatic life monitoring (ALM) at five mainstem sites on the middle portion of the Brazos River Basin, under the Texas Clean Rivers Program. Primary purposes have been to generate baseline data and determine if the designated high aquatic life use (ALU) is being attained. Secondary objectives have been to address potential impacts of specific factors along the river. The three sites in Segment 1206 are in an area where substantial rock quarry activities occur. Sites in Segments 1204 and 1257 are in reaches that have been impacted by golden algae related fish kills, and public concerns exist over the condition of sport fish populations.

Figure Legend	Segment	Station ID	Station Description	Assessment Date(s)
1	1206	18746	Brazos R. upstream of US 281 on Alexander property	5/4/05; 8/1/06
2	1206	18745	Brazos R. downstream of US 281 at Rivercrest Campground	5/19/05; 7/27/06
3	1206	18743	Brazos R. downstream of Allied Rock Mine on Jones property	5/20/05; 7/19/06
4	1204	20213	Brazos R. at FM 200 northeast of Glen Rose	5/20/08; 8/21/08
5	1257	12044	Brazos R. at FM 2114 southwest of Aquilla	3/26/09

Several patterns are apparent from the assessment results, the first being that physical habitat in the middle Brazos River is not particularly favorable for aquatic life, as seven of eight characterizations scored in the intermediate ALU range. Failure of physical habitat to attain a high rating was mainly a product of limited instream cover, relatively steep banks, low channel sinuosity, and an unstable substrate due to predominance of sand.



Brazos River upstream of US Hwy 281



Large mouth bass caught 3-26-09 during an aquatic life monitoring event.



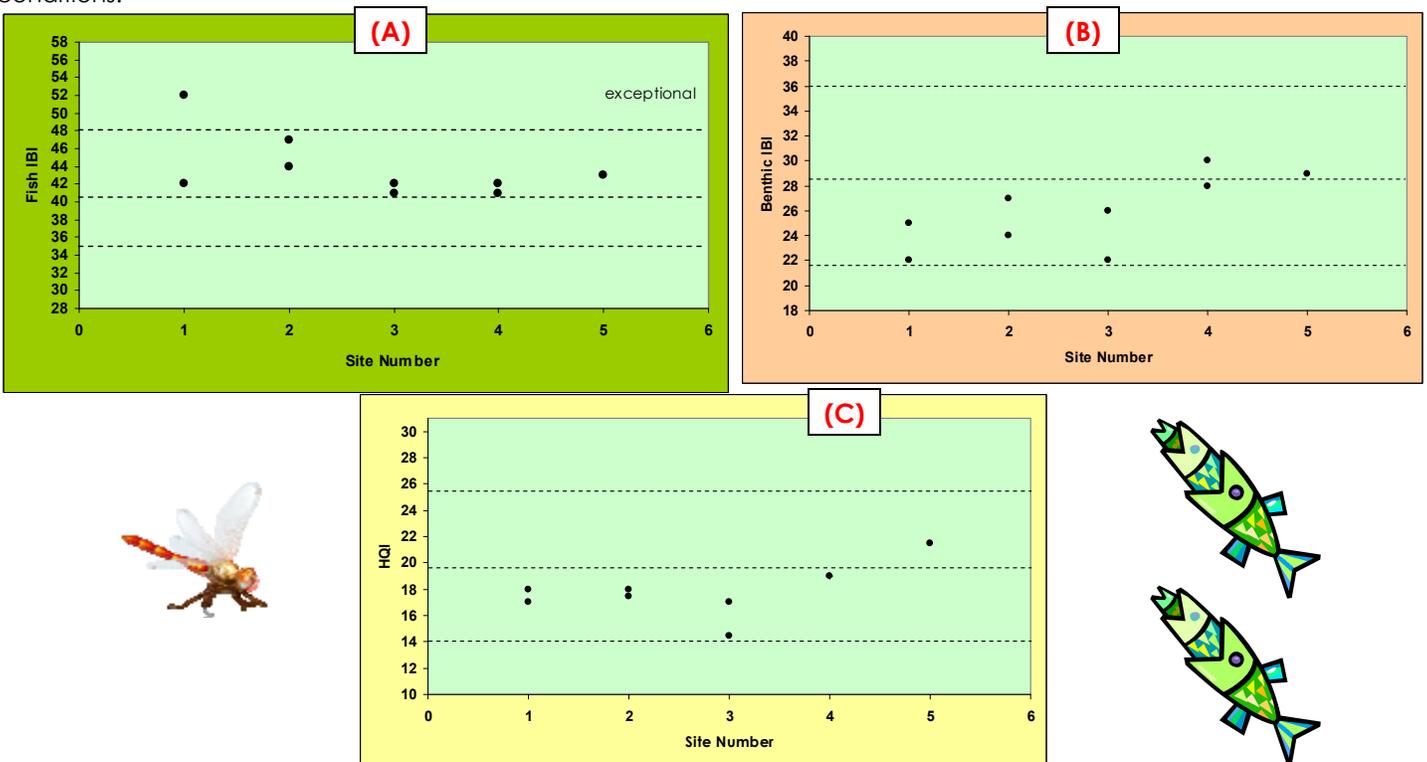
The Aquatic Life Monitoring on the Brazos River (continued from page 2)

Based on results for Sites 1-3, it was concluded that no appreciable aquatic life impacts resulted from rock quarry operations, as fish community integrity met ALU expectations and benthic macroinvertebrate shortcomings were largely attributable to natural habitat limitations. At Sites 4 and 5, fish communities were healthy, with game fish species well represented (e.g., largemouth bass in the 520-605 mm range, channel catfish in the 400-610 mm range, white bass, and flathead catfish). The condition of fish communities at the lower two sites indicated favorable water quality conditions during the assessments, and a lack of adverse effects by golden algae during periods leading up to the events. Whereas episodic fish kills have occurred at Sites 4 and 5 since 2000, a recovery period of at least a year preceded ALM events, which helps explain the favorable conditions that were observed.

Lower macrobenthic integrity reflected these habitat limitations, with benthic index of biotic integrity (IBI) scoring intermediate in seven of nine instances. None of the measured water quality parameters accounted for ALU nonattainment by benthic macroinvertebrates, and it was concluded that physical habitat limitations were primarily responsible. This appears to be a natural condition related to substrate characteristics, with a sandy streambed predominating through much of the middle Brazos. Numerous studies have shown that shifting sand substrates are not conducive for invertebrate colonization, because food materials are scarce and there are few solid objects that provide cover and allow attachment. Habitat quality index (HQI) scores and macrobenthic integrity were somewhat higher at the two downstream sites, reflecting a comparatively greater amount of rocky-bottomed substrate in those reaches. The most clear-cut generalization was that fish communities achieved or exceeded the designated high ALU in all instances, reflecting across-the-board attainment of integrity expectations for that component.

Discrepancies in ALU determinations using fish and benthic macroinvertebrates have been problematic for the 305(b) assessment. Segment 1206 was included on the 2008 303(d) list for an impaired macrobenthic community, based on data discussed above. However, the SWQM Guidance Advisory Workgroup has recognized that natural inherent differences sometimes exist between fish and macrobenthic integrity, and protocol revisions have been drafted regarding how these types of situations will be dealt with in future 305(b) assessments.

In an effort to increase the amount of data base for the mainstem of the Brazos, BRA is planning additional aquatic life monitoring in upcoming years at one site on the lower Salt Fork, one site on the lower Double Mountain Fork, one site near Graham, and four sites between Waco and Rosharon. Generation of baseline data through such an expanse of the Brazos will help characterize overall biological integrity in the basin, and facilitate future assessments of instream conditions.



Biological Monitoring Scores for the Middle Portion of the Brazos River—
 (A) Fish IBI Scores, (B) Benthic Scores, and (C) Habitat Scores

2010 Texas Water Quality Inventory is Underway

The Integrated Report (IR) (formerly known as the Texas Water Quality Inventory and 303(d) List of Impaired Water Bodies) describes the quality status of Texas' natural waters based on historical data and identifies water bodies that are not meeting standards set for their use. The IR satisfies the requirements of federal Clean Water Act Sections 305(b) and 303(d). A new IR is produced every two years in even-numbered years, as required by law. A 303(d) List must be approved by the EPA before it is considered final. The Integrated Report, which includes the 305(b) Report and 303(d) List, is due to EPA on April 1, 2010.

Before the assessment can begin, the SWQM Guidance Advisory Workgroup meets to advise the TCEQ on revisions to the **Guidance for Assessing and Reporting Surface Water Quality in Texas**. The Guidance is used to evaluate data and information for development of the IR. The workgroup met on June 9, 2009.

TCEQ Surface Water Quality Monitoring staff are working on developing the draft 2010 IR. To see the assessment time line, the proposed 2010 assessment guidance, and additional information on the topics discussed by the Guidance Advisory Workgroup go to

<<http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/swqmgawg.html>>

Critter of the Quarter – Grass Carp

The grass carp is one of the largest members of the minnow family. The body is oblong with moderately large scales, while the head has no scales. Grass carp are silvery to olive in color, lacking the golden hue of common carp, and they have no barbels. This species typically reaches sizes of 65 to 80 pounds in its native habitat.

Their feeding habits make them ideal for vegetation control, as they are capable of consuming 40% to 300% of their body weight per day in plant material. The species shows a high tolerance for salinity with specimens surviving for several days in water up to three times as saline as sea water.

Grass carp are native to large rivers in Asia, ranging from the Amur River in China and Siberia south to the West River in China and Thailand. Because of its utility as a biological control for aquatic vegetation, the grass carp has been legally introduced into at least 35 states in the US. In Texas, triploid (sterile) grass carp have been widely introduced in small private ponds and a few public waters. Diploid (non-sterile) populations have been established by escapees from legal experiments in Lake Conroe and illegal stockings. These fish are known to reproduce in the Trinity River-Galveston Bay area. Grass carp are potentially harmful to native resources. Currently, only triploid (sterile) grass carp are legal for use in Texas, and a permit is required to obtain them. Information from Texas Parks and Wildlife

<<http://www.tpwd.state.tx.us/huntwild/wild/species/gcarp/>>



Common Name: Grass Carp
Scientific Name: *Ctenopharyngodon idella*

Laurie Eng, formerly of the Brazos River Authority, holds a 40-lb. grass carp caught while electrofishing on the North Bosque River just above Lake Waco. In August 2009, Laurie became the newest member of the Water Quality Standards Group in the Monitoring and Assessment Section at TCEQ.

Biological and Habitat Data Collection Procedures

Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data (TCEQ Publication No. RG-416) provides a comprehensive source of information on conducting biological and habitat assessments using standardized methods. The procedures in this manual are used by the TCEQ as well as other monitoring personnel who collect biological data on behalf of the TCEQ's various water monitoring programs. Monitoring entities, such as the CRP planning agencies and other state and federal agencies submitting water quality data to the TCEQ, are required to follow these procedures. This document is available online at

<http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/wqm/mtr/swqm_procedures.html>

New Continuous Water Quality Monitoring Network (CWQMN) Sites in the Lower Rio Grande Valley

By Christine Kolbe, TCEQ

Potential sources of high TDS agricultural return flows to Segment 2302 are of concern to the Rio Grande Watermaster. The potential sources include the El Morillo Drain (Mexico), Rio San Juan (Mexico), Rio Alamo (Mexico) and Arroyo Los Olmos (US). Water quality data are needed to manage water quality in the Rio Grande and to notify irrigators of high dissolved solids concentrations which may be detrimental to irrigated crops.

To address these potential sources, the first CWQMN site was installed in the Lower Rio Grande Valley to monitor the effects of the El Morillo Drain. This site has been collecting temperature, pH, dissolved oxygen and specific conductance data every 15 minutes since December 4, 2006. Three additional sites were installed July 7-9, 2009, to address the potential impacts from the Rio San Juan (Mexico), Rio Alamo (Mexico), and Arroyo Los Olmos (US).

Site Name	CAMS No.	Tributary	County
Rio Grande at Hardwick Farms	737	El Morillo Drain	Hidalgo
Rio Grande at Roma, TX	767	Rio Alamo	Starr
Rio Grande at Rio Grande City, TX	781	Rio San Juan	Starr
Rio Grande below Arroyo Los Olmos	782	Arroyo Los Olmos	Starr

The sites collect temperature, pH, dissolved oxygen and specific conductance data every 15 minutes. The site data logger converts specific conductance to total dissolved solids (TDS) [$SC * 0.65 = TDS$] and reports it along with data from the *in situ* multiprobe instrument. Incoming data is scanned electronically for calculated TDS concentrations above the "trigger" level set for the stations. The trigger level, set at 1,000 mg/L, is based on the adverse impact of irrigating crops with water containing high TDS concentrations. When the TDS is >1000 mg/L, an email notification is sent to all subscribers, including the TCEQ Rio Grande Watermaster. This process was developed and has been in place since December 4, 2006 when the first CWQMN site was installed.

The sites are operated and maintained by staff from TCEQ's Harlingen Regional Office. These sites are also part of *The TCEQ Border Initiative* (TCEQ Publication GI-392).



Rio Grande at Rio Grande City (CAMS 781)

For additional information on these and other continuous water quality monitoring sites in the Rio Grande Basin go to <<http://www.texaswaterdata.org>> and click on [Continuous Water Quality Monitoring Stations and Data](#).

What's in a Word?

How many words can you make from "Surface Water Quality" in 10 minutes or less? All words must be four letters or more. See what we came up with on page 10.



The Power of One: Texas Stream Team Volunteer's Efforts Help Protect a Houston Area Stream

By Andrea Tantillo, Houston-Galveston Area Council

Anyone who thinks one person can't make a difference should talk to Luis Stuart. His keen observation and persistence led to the recovery of absent aquatic life and initiation of best management practices (BMPs) being implemented by two waste water treatment (WWTPs) in the Houston-Galveston area. Stuart has been a water quality volunteer with the Texas Stream Team, formerly Texas Watch, for several years. Regionally, the Texas Stream Team is conducted as part of the Houston-Galveston Area Council's Clean Rivers Program. As a volunteer, Stuart regularly monitors the water quality of a section of Spring Creek, and in late 2007 he started noticing something unusual—a distinct absence of frogs, turtles and minnows.

"I started noticing the aquatic life was becoming less and less and eventually was down to zero," Stuart said. Volunteers with Texas Stream Team provide monthly monitoring reports on a variety of parameters, including bacteria, dissolved oxygen levels, temperature, odor and clarity. In addition to monitoring and reporting specific water measurements, volunteers are also charged with noting field conditions, including weather and wildlife. "Field observations are one of the most important monitoring elements," said Kristi Tompkins, H-GAC Texas Stream Team coordinator. "As the volunteers spend more time at the reporting sites, they get a sense of what's normal for that area. If they start to notice changes, those changes can indicate there may be a problem."

Stuart continued his monthly monitoring, diligently noting the absence of specific wildlife. He said he wanted to make sure the absence wasn't simply a seasonal change, so he kept thorough notes. He also walked about a mile upstream, to a spot just 20 yards past two WWTPs, and noticed the aquatic life in that area appeared to be at normal levels. So, in May 2008, he contacted the Texas Stream Team program coordinator to voice his concerns. The coordinator forwarded his information to the TCEQ, which promptly scheduled an investigation.

"We process numerous data forms each month, and we may not notice the changes in an area as quickly as a volunteer would. It's good that he brought this issue to our attention," Tompkins said.

The TCEQ investigation revealed the two WWTPs were discharging high levels of chlorine into the creek. The TCEQ includes allowable chlorine levels in all wastewater discharge permits. Many permits also require the removal of chlorine before effluent reaches a stream. While the use of chlorine is a viable method for treating waste water before returning it to the stream, an excessive amount of the chemical can be detrimental to the ecosystem.

"Excessive chlorine sterilizes that segment of the stream and essentially turns it into pool water," Tompkins said. "You use chlorine in your pool to kill algae and bacteria. In a pool, these levels are needed. A natural water body needs plants, animals and a variety of living creatures for a healthy environment."



Luis Stuart (left), Texas Stream Team Volunteer, looks on as TCEQ Investigator Kim Laird (right) collecting a sample from Spring Creek.

Since Stuart's initial complaint, both companies have instituted BMPs to try to correct the situation. According to Kim Laird, Environmental Investigator in the Water Section of TCEQ Region 12, management at one of the facilities was unaware of the problem due to testing times and equipment consistency. This facility has installed new chlorine feed equipment to better control its chlorine output. The second facility has indicated that plans are being put in place to better moderate its chlorine output.

Stuart, one of 77 active volunteers at 68 monitoring station sites around the region, remains vigilant. In fact, following the initial resolution, he notified the Texas Stream Team that aquatic wildlife had increased in the area. However, he continues to notice an occasional decrease in wildlife in the area, leading to additional TCEQ follow up visits.

The Power of One (continued from page 6)

"I'm very pleased with the authorities and how they've handled this situation. I'm going to periodically keep going back (to the treatment facilities) and checking," Stuart said. "Eventually, we are going to get our creek back." Stuart's efforts, along with the efforts of all of the volunteers, are critical to maintaining healthy waterways. Currently, professional investigators monitor water quality on a quarterly, rotating basis, and investigators from TCEQ only conduct facility site visits every two to three years.

"Volunteers are able to find problems that we couldn't possibly find going out once every two years," Laird said. "Because of Mr. Stuart's efforts, we were able to find out about the problem and do something about it." Maintaining healthy waterways is essential to the region's economy and well-being. All of the creeks and streams in the Houston-Galveston monitoring area ultimately flow into Galveston Bay.

"We need healthy, clean and biologically-diverse waters to feed the bay and estuary," said Tompkins. "Basically, if you like to eat fish, oysters and shrimp, you want to keep your waterways clean. A large part of our local economy is dependent on the health of our local water bodies."

Stuart is retired after working for the same company for 43 years and was interested in finding an organization that would allow him to volunteer to help monitor water quality. A friend helped him get in touch with the Texas Stream Team, giving him the opportunity to take classes and become a certified water monitor. The section of Spring Creek that Stuart monitors is on his property, and over the years, he had seen the water quality there deteriorate. However, he said, in the past 10 years, the water quality has gotten significantly better with less litter in the creek and more wildlife in the area.

"When we first moved here, there wasn't much wildlife," Stuart said. "Now there is a healthy beaver population. I put out wood duck nesting boxes and have several wood ducks. And, I have a rookery of great blue herons on my property."

Stuart, a former Boy Scouts of America scout master, said he often encourages people to help clean up the environment by picking up just a few pieces of trash each time they go outdoors. He also encourages other Texas Stream Team volunteers to be diligent in their efforts and to take note of everything they see.

"Watch the whole environment where you're sampling," he said. "I had no way of knowing something was wrong, except the aquatic wildlife was gone."

Stuart said in addition to an increase in frogs, turtles and minnows, other aquatic life is beginning to flourish as well.

"Just last week my neighbor caught a three-foot catfish in the creek," he said, adding the neighbor released the fish back into the waterway.

Texas Stream Team is a network of trained volunteers who monitor water quality. Currently, over 1,400 Texas Stream Team volunteers collect water quality data on lakes, rivers and streams throughout the state. Volunteers complete three phases of training using a test kit that measures physical and chemical parameters in water.

If you are interested in the Texas Stream Team program or to become a certified Water Quality Monitor in the H-GAC Region, please contact Tompkins at kristi.tompkins@h-aac.com



Kim Laird (left), measures a sample with a high chlorine residual from Spring Creek under the watchful eye of Luis Stuart (right).

For more information on the **Texas Stream Team** go to
<http://txstreamteam.rivers.txstate.edu/>



DSHS Issues New Fish Advisory on Clear Creek (San Jacinto-Brazos Coastal Basin)

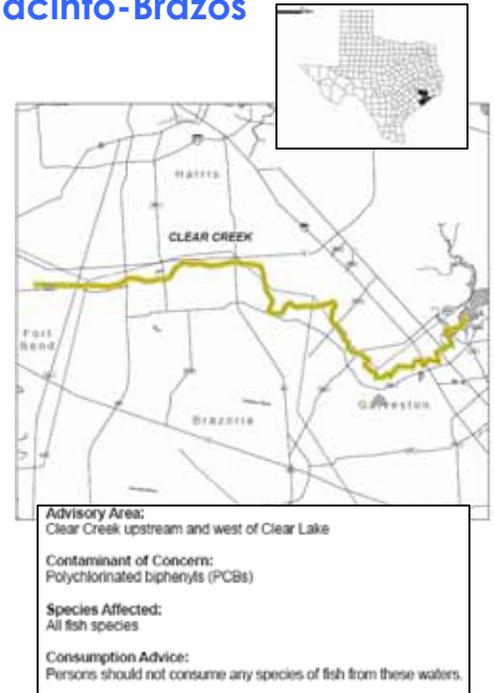
On July 8, 2009, the Texas Department of State Health Services issued an advisory warning people not to consume any species of fish from Clear Creek. The creek runs through parts of Brazoria, Fort Bend, Galveston and Harris counties.

The advisory was issued after laboratory testing showed elevated levels of polychlorinated biphenyls, or PCBs, in fish samples collected from the creek. DSHS tested tissue samples from seven species of fish as part of a re-evaluation of the creek. The creek previously was under a 1993 advisory for elevated levels of volatile organic compounds. That advisory was lifted in 2001.

Long-term consumption of PCBs may cause cancer and reproductive, immune system, developmental and liver problems. According to DSHS standards, PCB levels in fish above 0.047 parts per million (ppm) may pose a health risk to humans. PCB levels in the most recent Clear Creek samples averaged 0.100 ppm and were as high as 0.676 ppm.

PCBs are industrial chemicals once used as coolants and lubricants in electrical transformers and capacitors. The U.S. Environmental Protection Agency banned PCBs in 1979, but items containing PCBs did not have to be replaced. PCBs degrade slowly in the environment.

Elevated levels of PCBs in fish do not pose a health risk for humans swimming, fishing or participating in other water recreation activities in Clear Creek. A July 2008 advisory remains in place for Galveston Bay and its contiguous waters, including Clear Creek, due to elevated levels of dioxins and PCBs in spotted sea trout and catfish (*The Water Monitor*-Summer 2008 issue).



DSHS Fish Advisory Information

<http://www.dshs.state.tx.us/seafood/survey.shtm#advisory>

National Rivers and Streams Assessment Update

By Anne Rogers, TCEQ

The TCEQ, in cooperation with the Texas Parks and Wildlife Department is wrapping up the second year of the two-year study of probabilistically based sampling of rivers and streams in Texas. This project is intended to support a national assessment to be conducted by EPA. Of the 32 sites scheduled for the study, 22 are complete, leaving 10 sites to be sampled by mid-October. The study has been a monumental effort and could not have been accomplished without the extraordinary help of Surface Water Quality Monitoring (SWQM) staff in the TCEQ Regional offices as well as TPWD, who is under contract to conduct all the fish sampling for the project.



Texas Parks and Wildlife staff electrofishing on the Rio Grande (left) and the Nueces River (right).



TCEQ staff processing water quality samples (left) and doing habitat measurements (right) on the Nueces River.



Upcoming Events

Getting in Step Workshop

The Texas Water Resources Institute will host three "Getting in Step" workshops this September. The all day interactive training session will be held in Houston on **September 22nd, Austin on September 23rd and Dallas on September 24th.**

The workshop goal is to improve the effectiveness of outreach in Texas to reduce nonpoint source pollution, improve water quality on a priority watershed basis, and facilitate greater watershed based plan implementation.

Getting in Step is a guide for conducting watershed outreach campaigns developed by Tetra Tech and funded by EPA. To register for the course and view the agenda, visit: <http://watereducation.tamu.edu/schedule.php>.

Annual Surface Water Quality Monitoring Workshop

The twenty-third annual SWQM Workshop will be held **October 26-29, 2008** at the Canyon of the Eagles on Lake Buchanan, Texas. The workshop will begin on Monday, the 26th at 1:00 PM, with a half-day session for TCEQ SWQM Program staff only. The regular session— open to all— begins on the 27th. The workshop will end after lunch on Thursday the 29th.

The SWQM Program welcomes any ideas for workshop topics. We also welcome any offers to present findings of recent studies, new technologies, interesting aspects of monitoring in your region, or any related monitoring topics. For additional workshop information, to suggest a topic, or to make a presentation, please contact Anne Rogers, at anrogers@tceq.state.tx.us; 512-239-4597.

Land—Water—People 2009

As part of its annual conference series and its Initiative for Watershed Excellence program, the River Systems Institute will host Land, Water, People 2009 on **November 16-18, 2009** at the San Marcos Conference Center. In a program of over 75 expert presenters and workshop facilitators, we will explore the potential to more effectively manage and protect water resources, on both a local and regional scale, through applications to these important interfaces within watershed and community dynamics; Natural Systems Interface, Natural and Human Systems Interface, and People to People Interface.

As part of recognizing these interfaces, we will examine the dynamics within four ecological interface zones; land to water - riparian zone - coastal - groundwater/surface water and define the role of their ecosystem functions within watershed dynamics and the benefits of those functions to social and economic systems. As we identify the importance of these interfaces, we will identify the tools and approaches that promote and support collaboration between institutions and communities in order to more effectively manage water and other natural resources within our watersheds. For more information go to <http://www.rivers.txstate.edu/projects/conferences/Land-Water-People-09.html>

Fish Identification Short Course

A general fish identification short course is being held on December 16 -17, 2009 at Texas State University in Room 104 of the Freeman Aquatic Biology Building. The course has room for a maximum of 25 people at a cost of \$200 per person. The general course is designed to help people who know little about fishes and to be a review and expansion of knowledge for those people who know a lot about fishes. We cover basic fish morphology; osteology; taxonomic terms, counts, and measurements; family identification; and Texas freshwater fish species identifications. Each participant will receive a copy of *Freshwater Fishes of Texas: A Field Guide* by Thomas, Bonner and Whiteside and a "certificate of completion" for those finishing the course. For more information or to register for this course contact Bobby Whiteside at (512)754-1964 or bwiteside1@austin.r.com.



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