



TEXAS STATE UNIVERSITY
SAN MARCOS

Edwards Aquifer Research and Data Center



Newsletter

Spring 2007

The Texas Legislature established the Edwards Aquifer Research and Data Center in 1979. EARDC's mission is to promote the study, understanding and use of the Edwards Aquifer.

EARDC Staff

Director.....Dr. Glenn Longley
Hydrogeology.....Raymond Slade, Jr.
.....Rene Barker
Education.....Lendon Gilpin
Lab Manager.....Joe Guerrero
Biomonitoring..... Victor Castillo III
.....Meredith Cole
.....Lori Kalich
Administrative Assistants.....Gail Crews
.....Michelle Guardiola
Research Associates.....Michelle Allison
.....Cynthia Jackson
.....Stephen Porter
.....Barbara Porter
Student Workers. Diego Araujo
.....Jason Miller
.....Catherine Sutton

EARDC activities are organized around a Technical Services Center, an Education Center, a Research Center and a Data Center.

EARDC would like to wish good luck to Karen Serna, who left EARDC this past year for a position at the Risk Management and Safety Office at Texas State University. We would also like to wish good luck to Rebecca Cormier and Brent Moore, who have both graduated. Rebecca is currently working for Brown-Karhan Health Care Clinic in Dripping Springs. Brent is working as a part-time consultant.

Stephen Porter joined the EARDC staff in January 2007 as a part-time research associate in aquatic biology. He recently retired from the U.S. Geological Survey (USGS) where he was regional biologist and senior scientist for the National Water-Quality Assessment (NAWQA) Program. Stephen's areas of expertise include freshwater algae, macroinvertebrates, and water quality. He is the author of USGS protocols for collecting and analyzing algae data, as well as numerous articles on algal relations with the quality of streams, rivers, and lakes. Stephen participated in the development of technical guidance for the U.S. Environmental Protection Agency's (EPA) nutrient criteria for streams and rivers, and has examined algal-nutrient relations throughout the nation.



Stephen Porter

Barbara Porter also joined the EARDC staff in January 2007 as a part-time research associate in microbiology. A native Texan and graduate of the University of the Incarnate Word, Barbara was the primary water-quality microbiologist

for the Lexington-Fayette County (KY) Health Department for over 19 years. She also worked at the USGS's Biology Lab in Denver, Colorado. Barbara will be conducting *Cryptosporidium*, *Giardia*, and related water-quality testing at EARDC.



Barbara Porter, at work in the EARDC water analysis lab.

Agency Interns:

EARDC has a contract to supply interns to work year-around for the Texas Commission for Environmental Quality (TCEQ). TCEQ interns mainly work in the Division of Water Hygiene. Interns also work for Texas Parks and Wildlife Department (TPWD) and the U.S. Fish and Wildlife Service (USFWS). These internships are an excellent opportunity for students to get real-world experience and for the agencies to look at possible future employees. For information about these programs contact Dr. Glenn Longley at <mailto:GL01@txstate.edu>.

Technical Services Center Activities:

Biomonitoring services-

EARDC has provided freshwater biomonitoring services since 1990 and has participated in EPA's Quality Assurance Plan since 1991. Available services include 24-hour acute screen and definitive testing, 48-hour and 96-hour acute testing and 7-day chronic testing. An

ISCO Model 6712 Sampler is available for composite or sequential sampling services and for collection of industrial pretreatment samples.

In addition to performing toxicity testing, the biomonitoring lab cooperates with the U.S. Fish and Wildlife Service to collect individual Texas blind salamanders (*Typhlomolge rathbunii*), San Marcos salamanders (*Eurycea nana*) and Comal Springs salamanders (*Eurycea sp.*) and distribute them to refugia.



Victor Castillo measuring pH, DO, and specific conductance in Dead Man's Creek, northern Hays County.

For information about biomonitoring services, contact Victor Castillo III at (512) 245-3546 or e-mail <mailto:VC05@txstate.edu>.

Water analysis services-

EARDC has a contract with the City of San Marcos to monitor levels of endocrine disruptor chemicals in city water and wastewater treatment plants and in the wastewater collection system below the Central Texas Medical Center. As part of the project, Texas State aquatic biology graduate student Adam Foster has also been sampling the San Marcos River above and below the wastewater treatment plant and after each treatment process to see where removal is most effective for his Master of Science thesis project.

The EARDC water analysis laboratory has been providing environmental services since 1979. The EARDC lab is certified by the Texas Commission of Environmental Quality (TCEQ) for the analysis of bacteria in drinking, source, surface and wastewater.

The laboratory is equipped with basic water quality instrumentation and more advanced instrumentation such as Gas Chromatographs, Ion Chromatograph and Atomic Absorption Spectrophotometer with Graphite Furnace. Furthermore, EARDC has a Nikkon Optiphot-2 microscope equipped with an Episcopic-Fluorescence attachment and associated attachments for detecting *Giardia* and *Cryptosporidium*. EARDC is in the process of updating equipment to meet new EPA requirements for the analysis of *Giardia* and *Cryptosporidium*. After requirements are met and proficiency is demonstrated EARDC will seek certification for the analysis of *Giardia* and *Cryptosporidium*.

The EARDC Laboratory operates under a stringent Quality Assurance Program that insures that data produced is scientifically sound, legally defensible and of known documentable and verifiable quality. The quality assurance system at EARDC stresses training and planning that yields increased personal performance and improved laboratory management.

EARDC has provided a wide range of services for private citizens and numerous organizations including the Environmental Protection Agency (EPA), TCEQ, Texas Parks and Wildlife Department (TPWD), Barton Springs Edwards Aquifer Conservation District (BSEACD) and City of San Marcos. Current customers for the EARDC water analysis lab include the City of San Marcos and the City of Killeen.

EARDC provides opportunities for students to train alongside biologists and chemists as

student workers, work-study students or non-paid interns assisting in the preparation and performance of basic analyses. Students are trained and are allowed to perform analyses only after proficiency is demonstrated. Laboratory hours are Monday-Friday 8 a.m. – 5 p.m. Containers and sampling instructions can be provided upon request. Bacteriological samples are not accepted on Friday. Special arrangements can be made to submit samples on Friday or after hours, if necessary. For information about laboratory services, contact Joe Guerrero at (512) 245-3545 or e-mail <mailto:JG13@txstate.edu>.

Education Center Activities:

Texas Parks and Wildlife Department Community Outdoor Outreach Program –

This past year EARDC received a Community Outdoor Outreach Program (COOP) grant from the Texas Parks and Wildlife Department. The COOP program is designed to serve minority, female and at-risk youth. The grant was used to fund six 3-day aquatic sciences camps attended by 154 students and 15 teachers. The students and teachers collected aquatic organisms from ponds and streams, engaged in microscope labs, learned to conduct water quality tests, participated in Texas Parks and Wildlife's Amphibian Watch and Junior Angler programs, learned about wetlands and groundwater at Aquarena Center and enjoyed swimming and tubing in the San Marcos River.

Aquatic Sciences Adventure Camp –

The Aquatic Studies Summer Camp has been held each year since 1989. It provides students aged 9–15 the opportunity to learn about aquatic biology and water chemistry in a university atmosphere while also enjoying various water-oriented recreational activities. Information about the summer camp program can be found on the camp website, <http://www.eardc.txstate.edu/camp.html>.



COOP program camper with catfish that he caught in a pond on the Texas State University campus.

Four week-long and two 2-day camp sessions were held during the summer of 2006. The camps were attended by 155 students and 13 teachers. Many of the students who attended received sponsorships from the Edwards Aquifer Authority. For the summer 2007 camp sessions, the Edwards Aquifer Authority has agreed to renew its offer of camp sponsorships for students and teachers who live within the EAA's jurisdictional boundaries of Uvalde, Medina, Bexar, and parts of Atascosa, Comal, Guadalupe, Hays and Caldwell Counties. These sponsorships will cover the entire cost of the 2-day day camps and can also be used as partial payment for the week-long camp tuition.



Camper learning about microscopes during plankton lab.

Aquatic studies field days-

During the past year, 338 students and 48 teachers from 16 schools attended aquatic studies field days. The field day program gives students an opportunity to collect living aquatic organisms from a creek on the Texas State campus and observe them under a microscope. Students also learn about the Edwards Aquifer and its biota, collect organisms from a flowing artesian well and view San Marcos Springs from a glass-bottom boat at Aquarena Center. The field day website can be found at <http://www.eardc.txstate.edu/aquaticfielddays.html>.

For information about the Aquatic Sciences Adventure Camp or to schedule a field day, contact the education center at (512) 245-3541 or e-mail <mailto:LG16@txstate.edu>.



Students sampling for invertebrates in Sessom Creek.

Research Center/Data Center Activities:

Brian Slone completed a BS in Computer Science in 2003 at Texas Tech University and worked as a Programmer/Analyst for several years before going back to school full-time in 2006 to study biology. In the biological fields, his main interests are botany and aquatic biology. He is hoping to combine his background in computer science with opportunities in biology.

During the past year, **Raymond Slade** and **Rene Barker** (EARDC Staff Hydrogeologists) continued to assist the research and thesis-

related endeavors of several Texas State graduate students, including Eric Dedden, Jaimie Maher, Jeff Mitchell, and Susan Roberts. Also during this time, Raymond and Rene continued their associations and collaborative work (including proposal writing and fieldtrip participation) with Texas State professors Dr. Vincent Lopes, Dr. Walter Rast, Dr. Alan Groeger, and Dr. David Huffman.

Raymond and Rene, likewise, continued their interaction and active dialog with the Hays Trinity Groundwater Conservation District (HTGCD), Texas Parks & Wildlife (TPWD), Barton Springs/Edwards Aquifer Groundwater Conservation District (BSEACD), Texas Water Development Board (TWDB), Wimberley Valley Watershed Association (WVWA), Hill Country Alliance (HCA), as well as the USGS and other local, state, and federal water agencies.



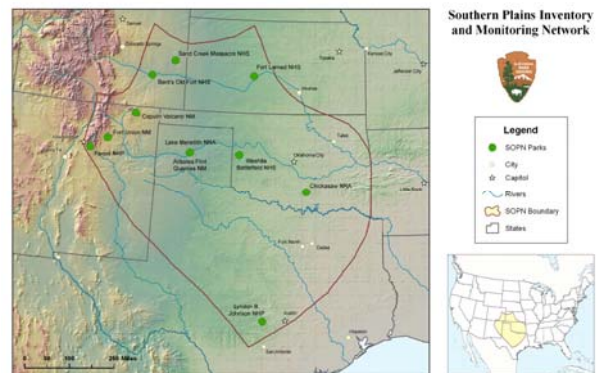
January 2007 fieldtrip to study outcrop characteristics of Trinity aquifer in dry streambed of Blanco River channel, five miles upstream of Wimberley. Representatives from Texas State's Department of Aquatic Biology and EARDC include graduate student Eric Dedden and professors Alan Groeger and Dave Huffman.

For example, to aid the HTGCD with their understanding of their district's hydrogeology, Raymond has advised the HTGCD with respect to many aspects of flood runoff and the association among rainfall, runoff, and aquifer recharge. Rene has, likewise, prepared maps of potentiometric conditions in the middle zone of the area's Trinity aquifer and evaluated rainfall distributions for various parts of Hays County, including Dripping Springs and Wimberley.

Other recent EARDC collaborations with the HTGCD include the:

- Review of aquifer-test analyses and groundwater-modeling reports;
- Compilation of guidelines for conducting Theis-based aquifer tests in the Trinity aquifer of western Hays County;
- Compilation of documents to explain how time-drawdown data measured from single (pumping) wells can be used to expedite the estimation of aquifer transmissivity;
- Derivation of a method for identifying and analyzing hydrologic and meteorological databases to document drought conditions for the Trinity aquifer;
- Development of statistical means of evaluating the probable effects of a proposed wastewater discharge site near the upgradient margin of the environmentally sensitive Edwards aquifer recharge zone; and
- Assistance provided by **Victor Castillo III** toward the construction and maintenance of HTGCD's Internet website.

Most of the efforts by Raymond, Rene, and Brian during much of last year (August 2006 – present) were invested toward a cooperative study with the Southern Plains Network (SOPN) of the National Park Service (NPS). As shown below, the SOPN encompasses 11 park units in Colorado, New Mexico, Kansas, Oklahoma and Texas.



Southern Plains Inventory and Monitoring Network of the National Park Service.

After consulting with various public and private agencies, SOPN accepted a proposal from EARDC to help with NPS's effort to improve the quality and quantity of water resources within the SOPN network. The resulting cooperative project, which began in August 2006, will extend through at least January 15, 2008. The project's overall objective is to promote the efficient and effective tracking of progress toward NPS's strategic goal of maintaining or improving the quality and quantity of the water resources within the park system. Dr. Glenn Longley, EARDC Director, serves as the Project Director for the project.

To best serve the NPS's needs, Raymond, Rene, and Brian are developing long-term monitoring protocols to cover the sampling, analysis, and observation of surface-water quality, surface-water quantity, and groundwater quantity (levels) at all SOPN parks. Through a combination of available "baseline" water-quality data that were assembled through existing programs and additional data to be acquired and analyzed through future activities, this study is designed to advance the understanding of relevant temporal trends in the water quality of streams and lakes (as well as groundwater levels) within each of the network's parks.

To satisfy the first two of four project phases, a statistical-based graphical procedure was developed and presented to the SOPN in February 2007. This Dynamic Graphical Procedure (DGP) was perfected by Brian to formulate—for selected parks, sites, and water-quality constituents—a scatter plot of data values and sampling dates, in addition to a least-squares linear fit of the data with which to identify and evaluate temporal trends in the water-quality database. Currently, the least-square fits of given constituent distributions are being used to evaluate temporal trends in existing water-quality data in order to more

effectively formulate protocols for the collection of future data.

For example, the DGP procedure is being used to identify SOPN sites with water-quality data that are either:

- Insufficient to summarize characteristics;
- Sufficient to evaluate characteristics for given prior-period of time; or
- Sufficient for trend analyses indicating substantial, slight, possible, or no temporal trend

What is learned from the scrutiny of previously collected water-quality data, and from the apparent trends in these data, will be used to construct fundamental guidelines for the future of SOPN's water-quality and groundwater-level monitoring programs.



Dead Man's Hole, northern Hays County.

Last year, EARDC personnel continued to monitor the water-quality of Dead Man's Creek (fig. 3) both upstream and downstream of Dead Man's Hole (fig. 4). EARDC-collected water samples were analyzed by EARDC's lab for pesticides, volatile organic compounds, total organic carbon, biochemical oxygen demand, turbidity, and nutrient and sediment levels. The serene, environmentally sensitive Dead Man's area supported swimming and recreational activities before the pool was contaminated during rainfall and runoff events as a direct result of irresponsible

dam construction immediately upstream of the Hole. Rene and Raymond's departmental report (R1-05/September, 2005) documented the background, hydrogeologic setting, and initial results of EARDC's monitoring program. A consulting firm is scheduled to remove the bulk of the sediment deposit from the Hole during April 2007. EARDC will continue monitoring water-quality conditions in the area and expects to re-sample the pool and adjacent reaches of creek after this cleanup work is completed.

Inquiries regarding EARDC hydrogeology activities may be made to Raymond Slade (<mailto:rs40@txstate.edu>) or Rene Barker (<mailto:rb42@txstate.edu>).

Study of the Springs of the Trans-Pecos Region of Texas:

EARDC is now in the third year of a study that focuses on collecting current water quality data for 28 springs in the Trans-Pecos region of Texas (Brewster, Culbertson, Jeff Davis, Pecos, Presidio, Reeves and Terrell Counties). Historic and current data on groundwater systems is being compared and analyzed for trends in water quality and flow. Spring biota is being studied by use of Rapid Bioassessment Protocols. This project is funded by USDA as part of the Rio Grande Basin Initiative. Texas State aquatic biology student David Flores completed his Master of Science thesis on this project this year.

To contact EARDC:

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