austin geological society

bulletin

volume 4

2007-2008

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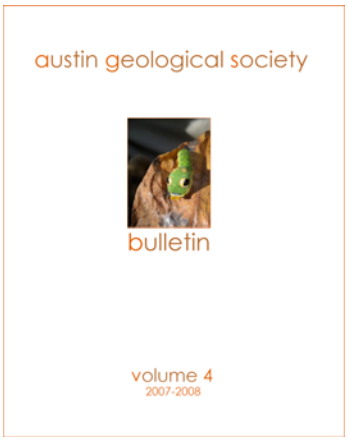


Image on preceding page: Caterpillar at Westcave Preserve (photo by Shane Valentine).

note from the president

We've had a wonderful year at the Austin Geological Society. Membership is currently over 150 with 40 percent of those new members! Attendance at meetings has also been really healthy these past few years, and that fosters a strong, congenial, and professional society. In addition to the seven outstanding lectures we had this year, a few additional highlights from the year include revising the website, amending the bylaws, holding a fieldtrip to Westcave and Reimers Ranch, awarding three $500 scholarships, participating in the "Maps in Schools Program," posting out-of-print guidebooks online, holding a poster session, giving out AGS Service Awards and, last but not least of all, publishing yet another great AGS Bulletin!

The success of any professional society, such as AGS, is directly related to the quality of its membership—here at AGS we are rich with both quality scientists and people—a historic attribute of AGS it seems (see Jim Sansom's historical note in this issue). Despite the fact that AGS is among the smallest (and notably poorest) of the 13 members in the Gulf Coast Association of Geological Societies, its members seem to be among the most diverse, with backgrounds spanning the myriad of geoscience disciplines. I am sure that many folks share my opinion that the very nature of AGS being a multi-disciplinary group is one of its strengths. I have learned a great deal from conversations with AGS members, and I feel very lucky to be a part of it. The founding and early members of AGS should be congratulated and thanked.

This year two AGSers moved out of state to pursue other job and life opportunities. Craig Caldwell (President 2005–2006; longtime Awards and Web Chair) moved to North Carolina. Will Boettner (President Elect 2007–2008) moved to Oregon. We thank them both for all their service and wish them well—they'll be missed. Shane Valentine (Vice President 2007–2008) stepped in as President Elect and will assume the Presidency for 2008–2009. Thank you Shane for being a great Vice President and stepping up to serve as our President.

Finally, I want to sincerely thank each and every AGS Officer and committee Chair—they have all done a superb job. A special thanks go to Scott Tinker and Wanda La Plant at the Bureau of Economic Geology who continue to support AGS with the use of their wonderful meeting facilities at the BEG.

It has been an honor and pleasure serving AGS and its members, and working with so many talented and interesting folks.

All the best!

Brian Hunt, 2007–2008 AGS President

note from the editor

As some of you know, I enjoy reading old scientific literature. And by old, I mean stuff that's has dust on it for at least 70 years. Vintage is perhaps a better word. One thing I enjoy about this vintage literature is how personable it is, almost like reading someone's diary instead of a scientific tome. If so-and-so helped you out on something, you mentioned so-and-so directly in your text.

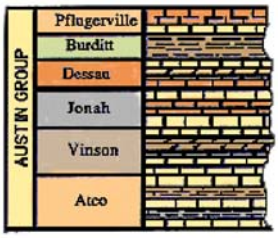
These old reports oftentimes hold surprises. A number of years ago, while at the Bureau of Economic Geology, I was reading a 1930s report for a groundwater study I was working on in the Mineral Wells area. The pages were delicate yellow, and I turned them with great care as if I had found a long lost treasure. To my surprise, the author noted in the sing-songy text that a nice young fellow down in Austin had analyzed water quality samples for him. That nice young fellow was none other than Virgil Barnes, who was still working at the Bureau as I read that report. The last thing I expected from those yellow pages was to see the name of someone I worked with!

Sometimes personable can be a little too personable if not downright libelous. I'm thinking about one of the reports to the Texas Legislature from one of the early, pre-1900 geological surveys. This report basically said, to mildly paraphrase, "Here is my report on our geological discoveries in Texas; however, before I give my report, I need to use 50 pages or so to defame that idiot who has questioned the veracity of my past research in Arkansas because that idiot doesn't know what he's talking about. Did I mention that the idiot that defamed my eminently correct and most excellent piece of research is an idiot?"

Libel aside, I think it's important to include our more personable sides in our work, perhaps not in our scientific papers (although you can try and slide some in…), but in other venues, such as this Bulletin. This is why we have a "Notes" section for the Bulletin—a catch-all for personable anecdotes as well as history and sizable tidbits of geologic interest. A contribution came in awhile ago, and the author was concerned it was too fluffy. "Send it in!" I yelped! "I'm all about the fluff!" Science should be fun, and oftentimes the fun of what we do is in the fluff, the stuff that happens between the science, gluing it all together.

I hope you enjoy this edition of the Bulletin, now in its fourth year. Thanks to the authors and the editors and a big thanks to Brian Hunt and his boundless energy for the Society and this Bulletin. As for the rest of you: Send me some fluff!

Robert E. Mace, Editor



austin geological society

bulletin, volume 4, 2007-2008

mission: The mission of the *Austin Geological Society Bulletin* is to (1) summarize the previous year's activities of the Society and (2) publish technical papers, comments, and notes concerning the natural sciences of Central Texas.

editor: Robert E. Mace, Texas Water Development Board

associate editors:
April Hoh, Texas Commission on Environmental Quality
Brian Hunt, Barton Springs/Edwards Aquifer Conservation District
John Mikels, GEOS Consulting
Sarah Davidson, Texas Water Development Board

information to authors: The Editor of the *Austin Geological Society Bulletin* invites contributions relating to the natural sciences of Central Texas in the form of technical papers and discussions. If you would like to submit to the bulletin, please see the instructions to authors at the end of this document. All submissions should be sent to the editor in digital format to editor@austingeosoc.org.

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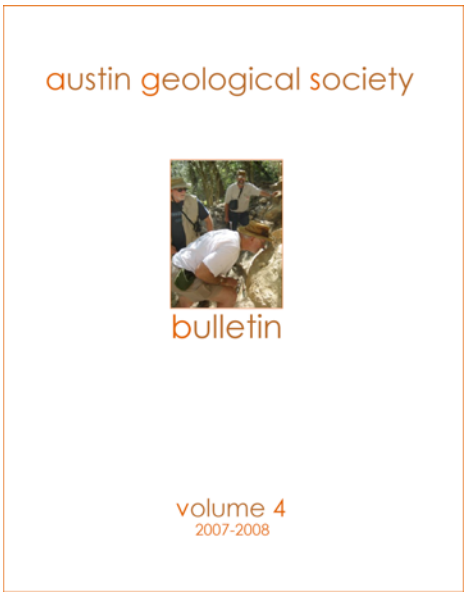

Cover photo: John Berry takes a whiff of the Hammett Shale (photo by Shane Valentine).

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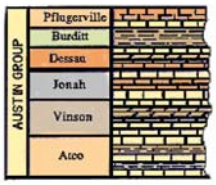

austin geological society

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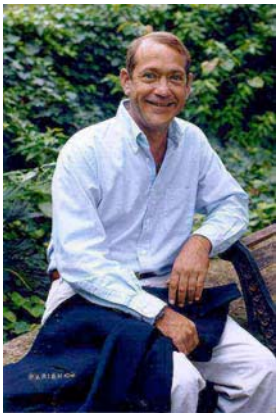
news from the society

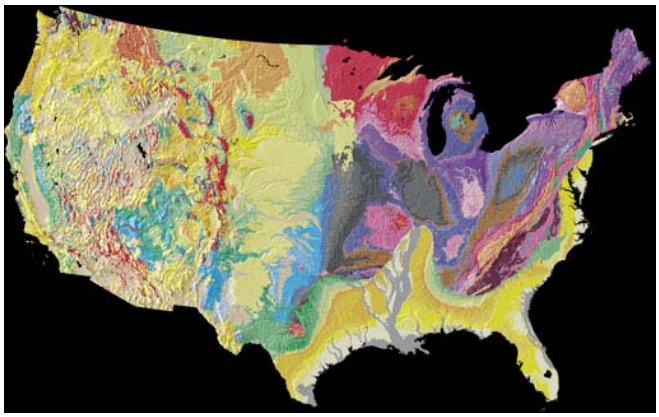


Loss in the Austin Geologic Community

Brent Christian passed away unexpectedly at his home on August 31, 2007. Brent had been a member of the Groundwater Resources Division at the Texas Water Development Board for over seven years, during which he was primarily involved in the collection of groundwater data that had been critical to the success of the groundwater availability modeling program.

Geologic Maps for Schools

The Society received a grant of $1,000 from the Gulf Coast Association of Geological Societies for a pilot project called “Maps in Schools”. John Mikels, Education Chair, laminated and framed 12 of the U.S.Geological Survey *Tapestry of Time and Terrain* maps for area schools (nine for the Austin Independent School District, one for the Del Valle Independent School District, one for the Leander Independent School District, and one for the Austin Nature Center). Volunteers delivered the maps and gave tutorials to teachers on what the maps were all about.



Sue Hovorka in Texas Monthly

Bureau scientist and Society member Sue Hovorka was featured in the February 2008 issue of Texas Monthly as one of the "Top 35 People Who Will Shape Our Future". Sue received this recognition because of her work at the forefront of CO_2 sequestration in Texas.

AGS Scholarships

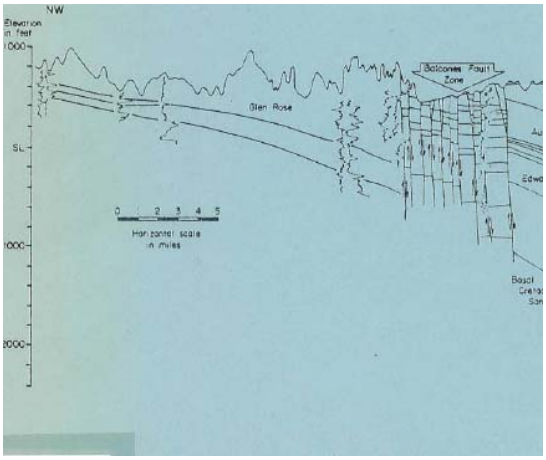
The Society awarded three scholarships in the amount of $500 to The University of Texas at Austin undergraduate students. Stephanie Cox and Natasha Gerke received scholarships for their outstanding academic and departmental involvement, while Julie Mitchell received the first AGS Field Camp Scholarship for her outstanding field skills. Natasha is pictured with AGS President Brian Hunt.

AGS Members Honored

Three long-time Society members were honored at the April 2008 meeting for their service to the Society. The members were Steve Ruppel, John Mikels, and Sigrid Clift. Sigrid Clift and John Mikels were given the AGS Public Service Award for their continued efforts in outreach and education. Steve Ruppel, who has managed AGS publications for many years, was given the AGS Distinguished Service Award. At right is AGS president Brian Hunt, Sigrid Clift, and John Mikels.

AGS Ball Caps

When you're out in the field, you need a hat to keep the sun out of your face. Fortunately, thanks to Will Boettner, you canow keep the sun out of your face in style with the AGS ball caps. Field work will never be the same again!

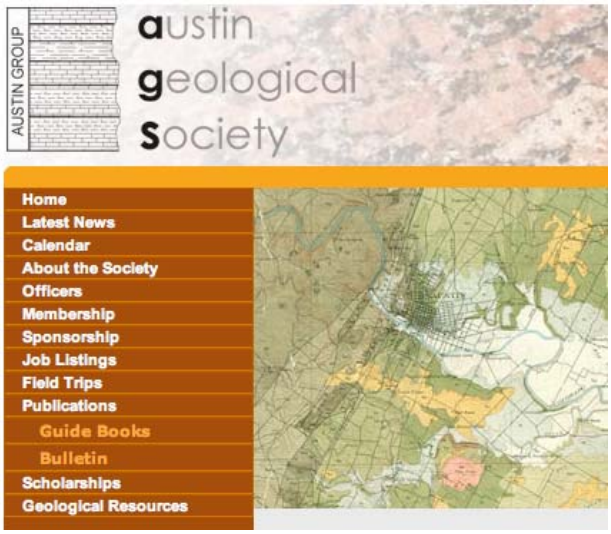


Out-of-print AGS guidebooks available online

The Walter Geology Library of The University of Texas at Austin has graciously posted out-of-print AGS Guidebooks on their website. There are nine guidebooks available and more coming! Thanks to Dennis Trombatore for making this happen. http://www.lib.utexas.edu/books/landscapes/browse_pubs.php

AAPG Delegates

The recent election to the American Association of Petroleum Geologists (AAPG) House of Delegates includes Laura Zahm, Mark Edwards, Scott Tinker, and J.D. Hughes. These folks will represent AGS as delegates for the next three years. Laura Zahm is the Chair of the AAPG Committee that will help the Society, and future presidents, stay in touch with AAPG.



AGS Website

The new website was launched November 5, 2007. Web Chair Craig Caldwell (President 2004-5) has moved to North Carolina. However, Craig still wants to have a hand back in Texas, and wants to keep improving the website. We still have some content to add to the site. Thanks for all your hard work over the years Craig--we'll miss you, but know you're there with us in cyber-space.

Amended Bylaws

At the first meeting of 2007-2008 we amended the AGS Bylaws to add two standing committees, one for Education and the second for the AGS Bulletin. By adding the committees to the Bylaws, we ensure some future commitment of the society to Education and to the AGS Bulletin.

Rizer Everett

The Society was greatly saddened to hear of the death of longtime member, Rizer Everett, on December 15, 2008. A stalwart at any AGS meeting and fieldtrip, Rizer was always a friendly geologic face. Because of his contributions to the Society, including a stint as president, Rizer was a honorary member. We are planning a section of remembrances for Rizer in the next Bulletin. Below is the obituary printed in the Austin American-Statesman on January 11, 2009.

Rizer Everett Rizer Everett, 92, died on December 15, 2008, after a brief illness, just a few blocks from his childhood home. He was born on June 9, 1916, in Belmar, New Jersey, in the manse of the Presbyterian Church, where his paternal grandfather was pastor. He attended elementary, junior high, and high school in Austin. Rizer graduated Phi Beta Kappa from the University of Texas at Austin in 1937 with BA and BS degrees in Geology. In 1937 he was employed by the Carter Oil Company and began his professional career as a field geologist in Wichita, Kansas. In 1938 Rizer was married to Hildegard Kuehne at the Congregational Church in Austin. While living in Shelbyville, Illinois, their son, John, was born in Effingham, Illinois, in 1940. Their daughter, Dorothy (Dot), was born in Wichita, Kansas, in 1943. Everett worked for the Carter Oil Company in Kansas, Illinois, Indiana, Kentucky, Louisiana, Wyoming, Oklahoma and Mississippi until 1954. He then transferred to the Standard-Vacuum Oil Company operations in Indonesia where he was Chief Geologist and later Exploration and Production Manager. He retired in 1966 while working in Djakarta and returned to Austin. Rizer then obtained his Master's Degree in Geography in 1969 at The University of Texas. Until 1982 he worked as a consulting geologist and geographer. He also taught Applied Geology of Energy Resources at University of Texas from 1978 to 1982. Rizer had an insatiable curiosity and a great sense of adventure. During their long, happy marriage he and his wife traveled extensively in the United States with children and grandchildren. They visited Asia, Europe, South America and Africa. Rizer inherited his love of woodworking from his father who was an artist and an architect. Rizer generously shared his home improvement skills with friends and neighbors. Rizer and Hildegard helped establish a biannual reunion for former Stanvac employees. The reunion continues to provide a sense of coherence for the community of people who together experienced a unique life- style. Rizer served as a member of the Austin Planning Commission (1974-76) and on the board of directors of the Peoples Community Clinic of Austin (1970-95) and the Exxon Annuitant Club of Austin (1986-88). He volunteered with several organizations including radio station KMFA. He was a member of the Geological Society of America, the American Association of Petroleum Geologists, and the Austin Geological Society. Rizer had fond memories of growing up in Austin and of his travels around the world. He entertained guests at his 90th birthday party by telling stories gathered from his long life. The attendees at the party included classmates from elementary school and college; fellow employees from Carter and Stanvac; colleagues from the University; and neighbors, friends, and family. Rizer treasured friendships from all phases of his life. He supported his friends and greatly appreciated their support, particularly in the last few years of his life when he lived at Englewood Estates and the Summit at Northwest Hills. He is survived by his son and daughter-in-law, John and Barbara Everett of Ft. Collins, Colorado; by his daughter and son-in-law, Dot and Bryan Waldrip of Albuquerque, New Mexico; by six grandchildren and 14 great-grandchildren; and a nephew and two nieces. All will miss his exuberant enthusiasm for life and the sound of his resonant baritone voice.

about the technical content

The technical content in the Bulletin consists of abstracts or extended abstracts for presentations, summaries of the field trips, technical papers, and notes.

presentation

The Austin Geological Society hosts technical presentations from invited speakers concerning the natural sciences. We publish an abstract in the Society's newsletter and allow for an extended abstract in the Bulletin.

posters

The Austin Geological Society hosts a poster session each spring. Presenters can submit an abstract concerning their poster topic. This year, we also received abstracts from young scientists from local schools who participated in the regional science fair.

field trip

The Austin Geological Society tries to have at least one field trip per year. The summary included here provides an overview of this year's trip. Interested readers are encouraged to purchase the guide book for additional information and details.

technical paper

The Bulletin accepts technical papers for publication provided that the papers meet technical and editorial requirements.

note

The Bulletin also accepts notes, which may be technical or anecdotal.

presentation

august 27, 2007, bureau of economic geology

Policy and Science—An (Ethical) Match Made in Heaven?

Robert E. Mace
Texas Water Development Board

In the ideal world, science and policy stroll down the wedding aisle arm in arm, smiling warmly to family and friends, eager to start their new life together. However, after the wedding bells stop clanging, the cake is gone, and those tans earned during that Bahamas honeymoon fade, reality sets in, with science often feeling like it's tied to the railroad tracks with the policy train a-steaming in the distance. A pure scientist, using the scientific method as their creed, wants to see reproducible results and testable hypotheses—and expects policy decisions to be based solely on fact. Policy, on the other hand, is often a complicated equation with the most transiently random variable of all: people. In most cases, the people making the policy decisions are not scientists. What appears as fact to a scientist is far more fuzzy to a policymaker. For the most part, policymakers want to base their decisions on good science. However, if a policy issue is controversial, then the waters get murky quick—with good science getting the murk. Savvy detractors to good science may attack the scientific method as being biased, claim unrealistic certainty to appear infinitely credible, and make mountains out of a study's molehills. Good science may trip on its own feet because of poor communication, a tepid defense, being non-transparent to the public, or having its scientists cross the "advocate line," a line that separates scientific facts from personal biases and personal opinions. What's a scientist married to policy to do? Recognize the flaws of your partner (as they recognize the flaws in you…), realize that facts are one small part of policy decisions, ensure that when you speak your voice is understood, remain ethical, and remember that, in the end, good science—as fact—always wins.

presentation

october 1, 2007, bureau of economic geology

Lessons from Earthquake Engineering Reconnaissance

Ellen M. Rathje, P.E.
Department of Civil Engineering
College of Engineering
The University of Texas at Austin

Earthquakes are damaging forces of nature that result in considerable loss of life and economic consequences each year. These losses are a direct result of the inability of the civil infrastructure to withstand strong earthquake shaking. Although we cannot hope to prevent future earthquakes, engineers work with earth scientists to design structures to withstand earthquake shaking. Towards this goal, each earthquake represents an opportunity to observe the effects of earthquakes first hand and to assess the success or failure of our design procedures. Thus, after each earthquake, engineers travel to the field to investigate the damage and to learn from their observations. This presentation will discuss the various lessons learned from earthquakes over the past 20 years, starting from the 1985 Michoacan earthquake that severely affected Mexico City and culminating in the 2004 Niigata Chuetsu, Japan earthquake that induced significant landslides. First hand observations and photos will be presented, and the use of new technologies, such as high-resolution satellite imagery and laser imaging, will be discussed.

presentation

november 5, 2007, bureau of economic geology

An Overview of Current Carbon Dioxide Capture and Geologic Storage (Sequestration) Activities in Texas

Timothy (Tip) Meckel, Ph.D.
Bureau of Economic Geology
Jackson School of Geosciences
The University of Texas at Austin

The Bureau of Economic Geology at The University of Texas at Austin was recently awarded a 10-year, $38 million subcontract to conduct the first intensively monitored, long-term project in the United States studying the feasibility of injecting a large volume of carbon dioxide for underground storage. The project in southwest Mississippi is designed to build public assurance about the use of carbon sequestration—storing carbon dioxide underground—to reduce atmospheric emissions. This presentation will provide an overview of carbon dioxide capture and geologic storage (sequestration) in the context of greenhouse gas mitigation and enhanced oil recovery. Past, present and future Bureau of Economic Geology field activities related to sequestration that are funded by the Department of Energy will be highlighted. Critical geologic research questions that will be discussed include seal performance, pressure evolution, and monitoring techniques. The future for carbon capture and storage in Texas looks promising—come hear about this important and rapidly developing new geoscience enterprise.

presentation

december 3, 2007, bureau of economic geology

The Texas Superfund Process and Five Case Studies

Diane Poteet
State Lead Section, Remediation Division
Texas Commission on Environmental Quality

The Remediation Division of the Texas Commission on Environmental Quality manages the Superfund Site Discovery and Assessment Program and the Superfund Program for Texas. Together these programs address sites that are abandoned, contain hazardous substances, and where enforcement is exhausted or no financially capable responsible party exists. Sites are referred to the Superfund Site Discovery and Assessment Program from many sources and then assessed for eligibility and ultimate ranking in either the state or federal Superfund programs. Immediate Removal Actions are also implemented by the Superfund Site Discovery and Assessment Program project managers. The phases of the Superfund Program are Remedial Investigations/Feasibility Studies, Remedial Designs/Remedial Actions, and Operations and Maintenance. As a site moves through the Superfund Site Discovery and Assessment Program and Superfund phases, it can be funded in different ways depending on who takes action and when.

Five case studies are provided that demonstrate some of the various funding mechanisms and diversity of the process. The first site is a special Removal Action referred to the Texas Commission on Environmental Quality by the Texas Legislature. The second site is a State-lead federally-funded Remedial Investigation conducted at a Federal Superfund site. The third case is a State Superfund site where a Federal Removal Action was completed prior to it being ranked as a State Superfund site. The fourth is a “House Bill 3030” groundwater case that was referred by the Texas Commission on Environmental Quality regional office and which was assessed and ranked under the federal program. The fifth case is a State Removal Action at a State Superfund site.

presentation

february 4, 2008, bureau of economic geology

Global Change Lessons from Earth History

Eric Barron, Ph.D.
Jackson School of Geosceinces
The University of Texas at Austin

The greatest strength of modern climate studies is the wealth of direct observations that capture the three-dimensional structure of state variables for the atmosphere and ocean and enable the development and validation of a suite of physically-based models. Confidence in climate model simulations stems from their ability to simulate the changes through the diurnal cycle, the seasonal cycle, and their ability to replicate the changes over the last century. Is that sufficient? The greatest weakness of modern climatology is a lack of perspective of significant changes in climate. In contrast, the great strength of the geologic record is its considerable perspective on the rates and magnitude of climate changes that have occurred throughout Earth history. The geologic record also has weaknesses. We interpret the state of the climate based on (a) a limited spatial distribution of observations and (b) proxy indicators. State variables cannot be measured directly; instead we depend on sedimentologic, geochemical, and paleontologic climate proxies. Despite this weakness, the record of climate change in Earth history should be significant partner in our efforts to understand future climate change. The geologic record includes three key types of information: (1) the rates of climate change, (2) the sensitivity of the climate system to a range of external forcing factors, including past greenhouse gases, and (3) the ability of climate models to simulate climate data from past warm and cold periods. It is clear from the geologic record that the climate system is sensitive to a variety of forcing factors and that significant climate change occurs on a variety of time scales. However, an examination of a wealth of simulations of past climates, using a variety of models, indicates that significant flaws in our ability to simulate climate remain.

presentation

april 7, 2008, bureau of economic geology

Multi-disciplinary Applications of the Gravity Recovery and Climate Experiment (GRACE)

Byron D. Tapley
Center for Space Research
The University of Texas at Austin

The mass transport between the Earth's atmosphere, oceans, and solid earth is a critical component of global climate change processes and is an important component of the signals associated with global sea level and polar ice mass change, depletion and recharge of continental aquifers, and change in the deep ocean currents. This mass exchange has a gravitational signal, which can be monitored as an indication of the process. The Gravity Recovery and Climate Experiment (GRACE) is a joint National Aeronautics and Space Administration (NASA) and Deutsches Zentrum für Luft- und Raumfahrt (DLR) mission whose purpose is to improve our understanding of the Earth's dynamical system by making pioneering measurements of the gravity signals associated with mass exchange between its components. The primary objectives are to measure (1) the Earth's time-averaged gravity field over the mission life and (2) the monthly variations in the gravity field at wavelengths between 400 and 4000 km. The accuracy sought in these two quantities is 1,000 times better than prior knowledge. The major time varying mass signal is water motion, and the GRACE mission is providing a continuous, multi-year record characterizing the seasonal cycle of mass transport between the oceans, land, and atmosphere; its inter-annual variability; and the secular mass transport. Measurements of continental aquifer mass change, polar ice mass change, and ocean bottom currents are examples of new remote sensing capabilities where the GRACE satellite measurements are used to look into the Earth's interior. In this presentation, we will briefly review the mission state and survey the multi-disciplinary science applications of the GRACE data being developed independently, and in conjunction with various satellite (TOPEX/Poseidon, Jason-1, ICESat) and in-situ data. Some relevant topics where recent progress has been made include the determination of water storage changes in global river basins; the extraction of evapotranspiration across the land-atmosphere boundary, which is of significance for atmospheric models; and the variations in the global ice-sheets and their contributions to sea-level. Over the oceans, we will discuss the contributions to the determination of the ocean currents and their time-variability as well as its contributions to the separation of the steric and mass variations in the global mean sea level. We will conclude with remarks on the GRACE mission plans and outlook for the future.

presentation

may 5, 2008, bureau of economic geology

Changes in the Land: Environmental History of the Austin Ecosystem

Kevin Anderson
Center for Environmental Research at Hornsby Bend
City of Austin

Environmental history is the study of humans and nature and their past interrelationships. Since the arrival of Pleistocene humans and onward through the founding of City of Austin in 1839 to the present, there have been profound changes made to the ecosystem of the Austin area. I will examine some of these historical changes to the landscape and to the composition of the community of non-human others wrought by the invasion of the non-native species—Homo sapiens.

posters

march 3, 2008, bureau of economic geology

The March meeting of the Austin Geological Society was the annual poster session meeting with 15 posters on display. Below is a list of poster titles and authors including four posters by middle and high schools students.

- Groundwater supplies and availability in Texas: results from the 2006 regional water plans and the 2007 State Water Plan—Robert Mace[1] and Sarah Davidson[2]; [1]*Texas Water Development Board and* [2]*The University of Texas at Austin.*
- Multiport monitor well for the Edwards and Trinity aquifers, Balcones Fault Zone, Central Texas—Brian Smith and Brian Hunt; *Barton Springs Edwards Aquifer Conservation District.*
- Variation in the freshwater-saltwater system on North Padre Island, Texas: free convection or Ghyben-Herzberg lens?— Mishal Al-Johar, Sarah Davidson, Benjamin Linhoff, Daniella Rempe, and John Sharp; *The University of Texas at Austin.*
- Applications of computed tomography in paleontology and geology—Girish Tembe; *The University of Texas at Austin.*
- Controls on sulfate variability in groundwater at lignite mine, northeast Texas—Margaret Cagle and John Sharp; *The University of Texas at Austin.*
- The secondary permeability of "impervious" cover in Austin—Thomas Wiles and John Sharp; *The University of Texas at Austin.*
- Paleorecharge in arid northwest China: Geochemical inferences and application to predicting hydrologic response to climate change— John Gates[1] and Mike Edmunds[2]; [1]*Bureau of Economic Geology and the* [2]*University of Oxford.*
- Introduction to geophysical methods and their application to engineering and environmental site characterization—Douglas Laymon; *Tetra Tech.*
- Geologic map of the southeast part of the Austin, Texas, 30×60 minute quadrangle: central Texas population corridor encompassing Bastrop and Smithville—Edward Collins; *Bureau of Economic Geology.*
- Geologic sequestration of CO2: strategies for monitoring large volumes commercial injection— Susan Hovorka, Timothy Meckel, and Ramon Trevino; *Bureau of Economic Geology.*
- The geology of the Cypress Creek watershed, Wimberley area, Texas—Alex Broun, Leslie Llano, and Doug Wierman; *Hays-Trinity Groundwater Conservation District.*

Student science fair posters

The Austin Regional Science Festival was help at Palmer Auditorium on February 21, 2007. The following AGS members volunteered their time and talents as judges in the Earth Science and Environmental categories: Linda McCall, Shirley Wade, Scott Tiller, Andrew Donnelly, Eric Radjef, and John Mikels. Four Austin area students were recognized for their exemplary projects with the AGS Award Package (Certificate of Recognition, Exhibition of their project at the AGS March Poster Session Meeting, a guided tour of the Bureau of Economic Geology, and publication of their project abstract in the AGS Bulletin). These four students include:

- Willow Howard, 8th Grade, Dripping Springs Middle School (Dripping Springs Independent School District), "It's Raining, It's Pouring... Are Pollutant Levels Soaring? (A Study of the Effects of Rainfall on the Water Quality of Barton Creek)";
- Zach Noah, 9th Grade, Bowie High School (Austin Independent School District): "Marina Impact on the Environment";
- Cassie O'Connor, 12th Grade, Vista Ridge High School (Leander Independent School District), "The Relationship Between Weather Patterns and the Spread of West Nile Virus in the US"; and
- Arvind Bala, 6th Grade, Harmony Middle School (Austin charter school), "Wetland Purification for Potable Water".

The Relationship between Weather Patterns and the Spread of West Nile Virus in the United States

Cassie O'Connor
Vista Ridge High School

Can the spread of West Nile Virus be attributed to weather patterns? When summer months are warmer than the average temperature and precipitation during those months is also greater, the chances for West Nile Virus in that area will be higher. This would be useful in preparing the public for the spread of the virus, combining meteorology with medicine and health.

The weather patterns of six "sample" cities were researched and compared with their normal weather patterns for the years 1999 through 2007, the years that West Nile Virus has been present in the United States.

The correlation between temperature patterns and the spread of West Nile Virus is more pronounced than that of the correlation between precipitation patterns and the spread of the disease. This conclusion was accepted for New York, New York, during 1999 and even more so in 2002 and 2003 at the height of the infection's presence in the United States. For Macon, Georgia, in 2001, almost the exact opposite was true. In Lincoln, Nebraska, in 2002, the conclusion was again accepted. Lubbock, Texas, did not follow this correlation in 2002. For Fresno, California, in 2002, the conclusion was again proven. In 2006 the West Nile Virus reached Washington, and Yakima showed above average temperatures during those summer months. Precipitation data for Yakima was unavailable.

Cassie O'Conner is a 12th grader at Vista Ridge High School in Cedar Park, Texas.

It’s Raining, It’s Pouring... Are Pollutant Levels Soaring?

Willow J. Howard
Dripping Springs Middle School

The purpose of this experiment was to determine if significant rainfall affects the water quality of a specific segment of Barton Creek. This was done by measuring pollutant levels both before and after rainfall events. Higher pollutant levels would indicate pollution from agricultural runoff, acid rain, or both. Three tests were conducted over a six-week period, once following rain and twice during periods of no rainfall. Visual surveys of the area were made, and pollutant levels in creek water samples were determined using a commercial water quality monitoring kit, that tested eight water quality parameters. Tests conducted did not reveal any significant difference in the water quality of the creek over the six-week period. However, the one episode of rainfall during testing, while almost 3”, was too slight to saturate the ground and cause runoff. Additional testing will be undertaken when runoff occurs, to determine if the anticipated rise in pollutants follows. A particularly disturbing result was the elevated levels of fecal coliform bacteria found in all three test samples. Additional monitoring will be conducted to better characterize the coliform levels. While current results are inconclusive, continued water quality monitoring (especially following rain that has created runoff) will provide additional data regarding pollutant levels.

Willow J. Howard is an 8th grader at Dripping Springs Middle School in Dripping Springs, Texas.

Marinas' Impact on the Environment

Zach Noah
Bowie High School

The objective of my project was to determine the effects of boating marinas on aquatic fauna within the marinas. This was done by observing fish and microscopic aquatic life at four marinas located on Lake Travis (Austin Yacht Club, Emerald Point Marina, and a cove near each of these marinas). At each location, water samples were collected at ten feet deep and at five feet above bottom. The fish species at each sample depth were also noted. The species and populations of the fish and microorganisms from each sample point were then determined. This data was then compared to the water conditions that they optimally occur in, versus the water conditions at the sample sites. The conclusion was that the Austin Yacht Club was beneficial to the environment and that the Emerald Point Marina was harmful to the environment and that the two coves were very alike.

Zach Noah is a 9th grader at Bowie High School in Austin, Texas.

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field trip

Fall 2007 Field Trip

Reimers Ranch and Westgate Preserve—Landscapes, Water, and Lower Cretaceous Stratigraphy of the Pedernales Watershed, Western Travis County, Texas

trip coordinators:

Brian Hunt, Chock Woodruff, and Eddie Collins

contributors:

John Ahrns, Raymond Slade, Eddie Collins, Al Broun, Tom Hegemier, and Janie Hopkins

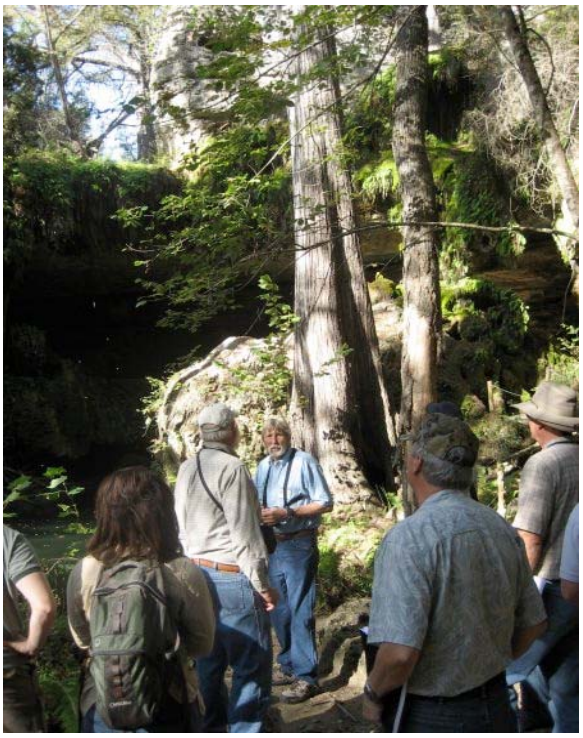
trip summary:

Brian Hunt

On Saturday October 20, 2007, Austin Geological Society conducted a field trip to Westcave Preserve and Milton Reimers Ranch Park in western Travis County. We experienced beautiful weather as we explored the geology and hydrology of those unique lands. The trip was coordinated by myself, Chock Woodruff, and Eddie Collins and attended by about 45 folks.

The trip began at Westcave Preserve with a tour by naturalist John Arhns. John introduced the geology of the canyon and grotto area and explained the natural fauna of the preserve in great detail. John explained the transformation over the years as nature (and their stewardship) reclaimed the stressed landscape.

Caterpillar at Westcave Preserve.



John Arhns discussing the Westcave Grotto to AGS members.

From the preserve the group walked down to Hammetts Crossing where Raymond Slade reviewed the 1952 flood which, as he described it, was the "perfect storm and flood" with a rise of about ~70 ft at Hammetts Crossing!

The geology portion of the trip began with Eddie Collins as he reviewed the lower Cretaceous stratigraphy and walked us through the type section of the lower Cretaceous Sycamore Sand—a sequence of fining upward fluvial facies. The Sycamore Sand (Hosston Formation in subsurface) is part of the lower Trinity Aquifer—increasingly a target for groundwater production in the Hill Country. One of the accomplishments of the field trip and guidebook was clarification of some of the confusion about the Sycamore and Hammett Shale at this exposure (see the paper by Collins in the guidebook). Much discussion of the nature of the sediments ensued.

Lunch was in held under the oaks at Westcave Preserve—a poster presentation from Tom Hegemier discussed the watershed studies of the LCRA. In particular Tom discussed some of the recent controversial developments impacting streams feeding Hamilton Pool.

Our last talk at Westcave Preserve was a poster presentation by Al Broun (a preview of his poster for the Gulf Coast Association of Geological Societies annual meeting) in the beautiful exhibit hall. Al discussed his subsurface geologic work of the Trinity Aquifer and, in recognition of his excellent (and unprecedented) detailed work, Andrew Backus (Board President of the

Tom Hegemier discussing watershed studies conducted by the Lower Colorado River Authority.

Al Broun (right) receives the famed Orbitolina Texana Award for Excellence at Westcave Preserve after his poster presentation.

Hays Trinity Groundwater Conservation District) bestowed upon Al the "Orbitolina texana" award for excellence.

Next the fieldtrip moved to the climbing area on the Milton Reimers Ranch Park to view the next two formations above the Sycamore Sand. The Hammett Shale overlies the Sycamore Sand and is generally a confining unit for groundwater. The Cow Creek Limestone is a very porous and permeable unit and principle aquifer of the Middle Trinity Aquifer. In the parking area Eddie Collins displayed six boxes of core taken in 1956 by the Shell Oil Co. investigators Lozo & Striklin at Hamilton's Pool. The core serves as the type section for the Hammett Shale and overlying Cow Creek Limestone. Participants then proceeded down into the climbing area to view the same stratigraphic units in outcrop. The climbing area showed the cross-bedded, beach facies of the Cow Creek, grading down into the more muddy facies of the lower Cow Creek, or upper Hammett Shale, depending on which reference in the literature you use.

AGS members discuss the Sycamore Sand at Hammetts Crossing. Eddie Collins led discussions on the lower Cretaceous geology.

Upon leaving Reimers Park the group stopped in a ditch along the road to view an exposure of mud (floodplain) and sand (channel) facies of the Hensel Sand. The Hensel Sand overlies the Cow Creek and much discussion focused upon its function in recharge to the Cow Creek (see Woodruff paper). Janie Hopkins discussed the

depositional setting of the Hensel and in particular the bizarre-looking *calcretions* (and other weird names) found in the muddy facies.

The last brief stop was to look at the Corbula Bed of the Glen Rose before heading back to Austin. The famed Corbula Bed divides the Lower and Upper Glen Rose and is used to delineate the Upper Trinity Aquifer.

It was a great trip with a wonderful group of folks. Our hope is that Guidebook 28 is a resource for years to come. Many thanks to wonderful contributions by the authors and thanks to Steve Ruppel for getting the guidebook printed and Linda McCall for taking care of all the myriad of financial items that go along with these trips.

All photos by Shane Valentine.

The Geology of the Cypress Creek Watershed, Wimberley Area, Texas

Alex S. Broun[1], Leslie Llado[1], Douglas A. Wierman[1,2], Andrew H. Backus[1]

[1] *Hays Trinity Groundwater Conservation District,* [2] *Environmental Resources Management*

Abstract

Jacob's Well is an artesian spring that provides the majority of flow to Cypress Creek in Wimberley, Texas. Flows were significantly reduced during the 2005 to 2006 drought and the well ceased to flow in 2000. Because of the importance of the spring to the community, the River Systems Institute at Texas State University awarded a grant to the Hays Trinity Groundwater Conservation District to study the hydrogeology of the Cypress Creek Watershed. The initial phase of the project characterizes the Trinity Group stratigraphy and the hydrogeologic framework of the watershed and the spring. Cuttings samples and geophysical logs were collected from local water wells and analyzed for lithostratigraphic data. Logs were correlated and the resulting stratigraphic and structural interpretation was tied to outcrop observations. Three structural cross sections were built across the study area, including one at Jacob's Well. The sections depict the geology and karstic nature of the faulted and fractured Trinity Group and its relationship to the Balcones Fault Zone. Ongoing studies will gather and analyze water quality and hydraulic gradient data to determine the source of recharge to Jacob's Well and establish metrics to protect spring flow.

Introduction

Cypress Creek, located in the Wimberley, Texas, area, is a major contributor to the aesthetics and quality of life of the residents of the Wimberley Valley. It is also an important economic engine in the area that drives the local tourist economy. Jacob's Well, a karst spring located in Cypress Creek, provides the majority of flow in Cypress Creek and has been described as the "heart and soul" of the Hill Country. Other than a minimal number of individual residential rainwater harvesting systems, the Wimberley Valley is totally dependent on groundwater for its potable water. With the continued rapid growth and development of the Wimberley Valley, and several hot, dry Texas summers, there are ever increasing demands being placed on the groundwater resources of the community. Flows from Jacob's Well were significantly reduced during the drought of 2005 to 2006, and the well ceased to flow in 2000 for the first time in recorded history.

In recognition of the importance of Cypress Creek and Jacob's Well to the Wimberley Valley community, the Hays Trinity Groundwater Conservation District was awarded a grant from the River Systems Institute of Texas State University to study the hydrogeology of the Cypress Creek Watershed (Figure 1) and Jacob's Well. This paper presents the results of the initial phase of the project, which aims to characterize the local stratigraphy and hydrogeologic framework of the watershed and the spring. Ongoing studies are underway to gather and analyze water quality and hydraulic gradient data to determine the source of recharge to Jacob's Well and identify factors to protect spring flow. This work is also part of a larger project by Texas State University to develop a model to predict the impact of future development within the watershed on water quality and availability in Cypress Creek.

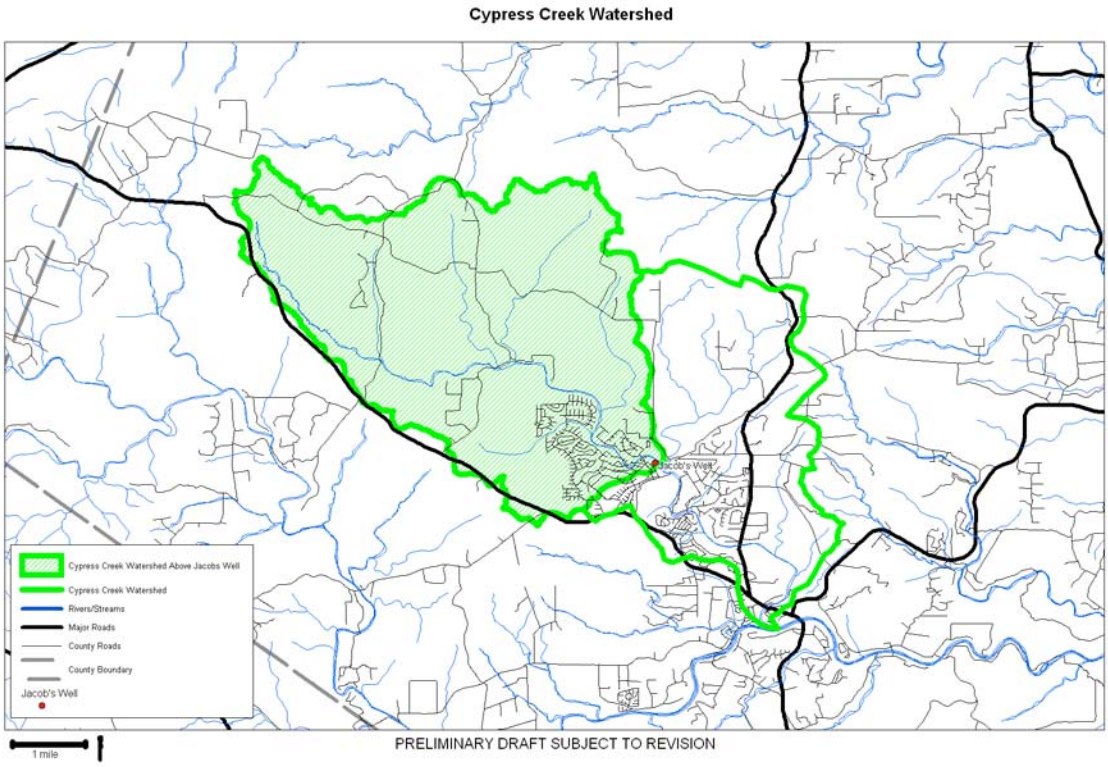


Figure 1. Cypress Creek Watershed

Regional Geologic Setting

The Trinity Group in western Hays County is Lower Cretaceous in age, extending from the Neocomian to the Albo-Aptian. There are producing aquifers in the Upper (Upper Glen Rose), Middle (Lower Glen Rose, Hensel, Cow Creek) and Lower (Sligo, Hosston) Trinity that supply groundwater to local residents. The geologic section that is approximately 1,000 feet thick consists of the wedge-edge of a shallow-water, carbonate shelf which "onlapped" the thrusted Paleozoic rocks of the buried Ouachita Mountains. The Llano Uplift and highlands to the west and northwest provided a provenance for a coarse-clastic sedimentary base (Hosston) that shoals upwards in a series of carbonate-dominated sequences. Tectonic movement during Early Miocene time resulted in a series of northeast-southwest striking, en-echelon, normal faults that

cut the Lower Cretaceous sedimentary rocks and drop the section by as much as 1,200 feet to the south-southeast (Balcones Fault System). The younger Edwards section has been stripped off over most of the western portion of Hays County but is preserved in the down-dropped fault blocks to the east-southeast (Edwards recharge zone).

Methodology

To better understand the hydrogeologic framework of the local aquifer systems several geologic cross sections were created to illustrate the vertical relationship between the area aquifers, faults and Jacob's Well (Figure 2). The project was done using readily available (inexpensive) data and is the first step in understanding the hydrogeologic framework that influences the aquifer system.

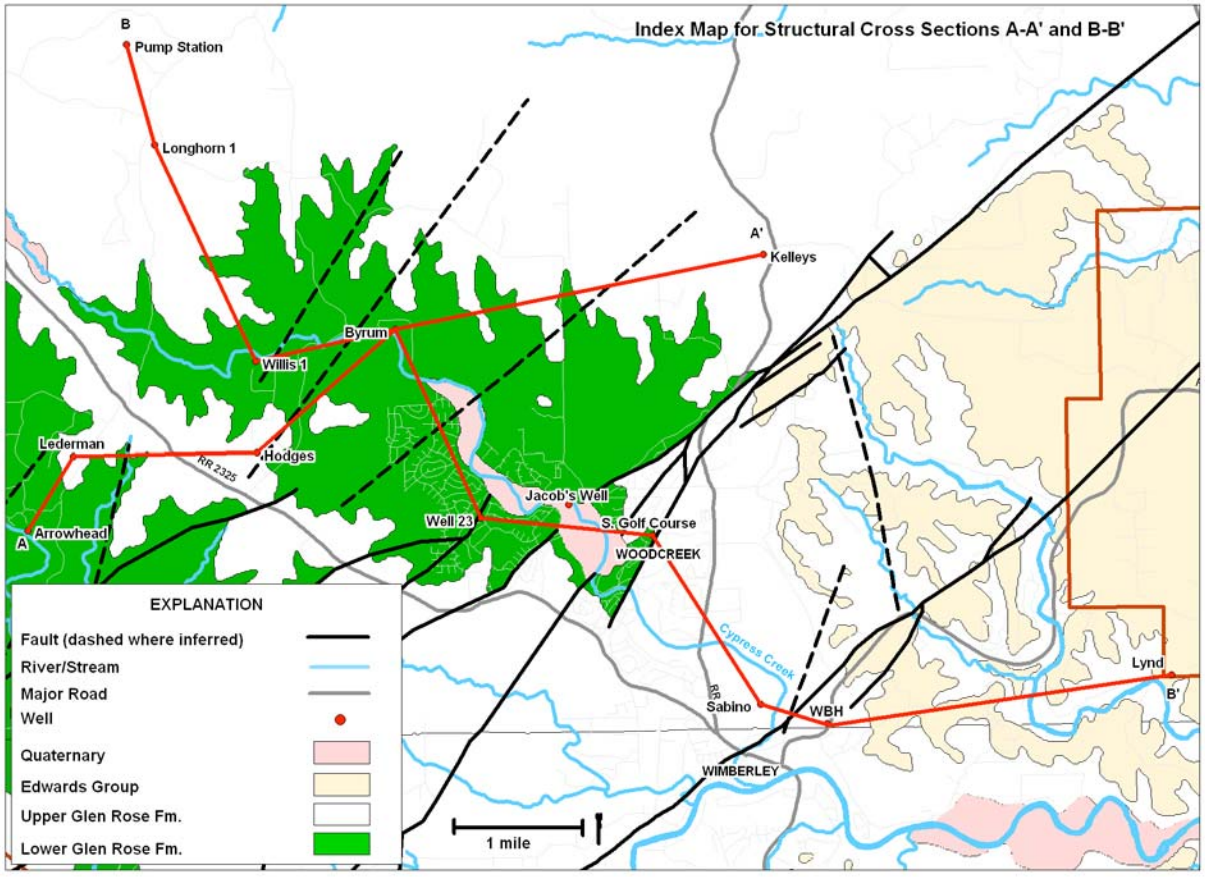


Figure 2. Index map for cross sections A to A' and B to B'

Basic exploration geology methods were applied for mapping and evaluating groundwater resources (look at the rocks!). Cuttings samples and geophysical logs (natural gamma) from Hays County water wells were collected and analyzed for lithostratigraphic data and unit tops. Geophysical logs and rock cuttings are archived at the Hays-Trinity Groundwater Conservation District's offices. The logs were correlated and the resulting stratigraphic and structural

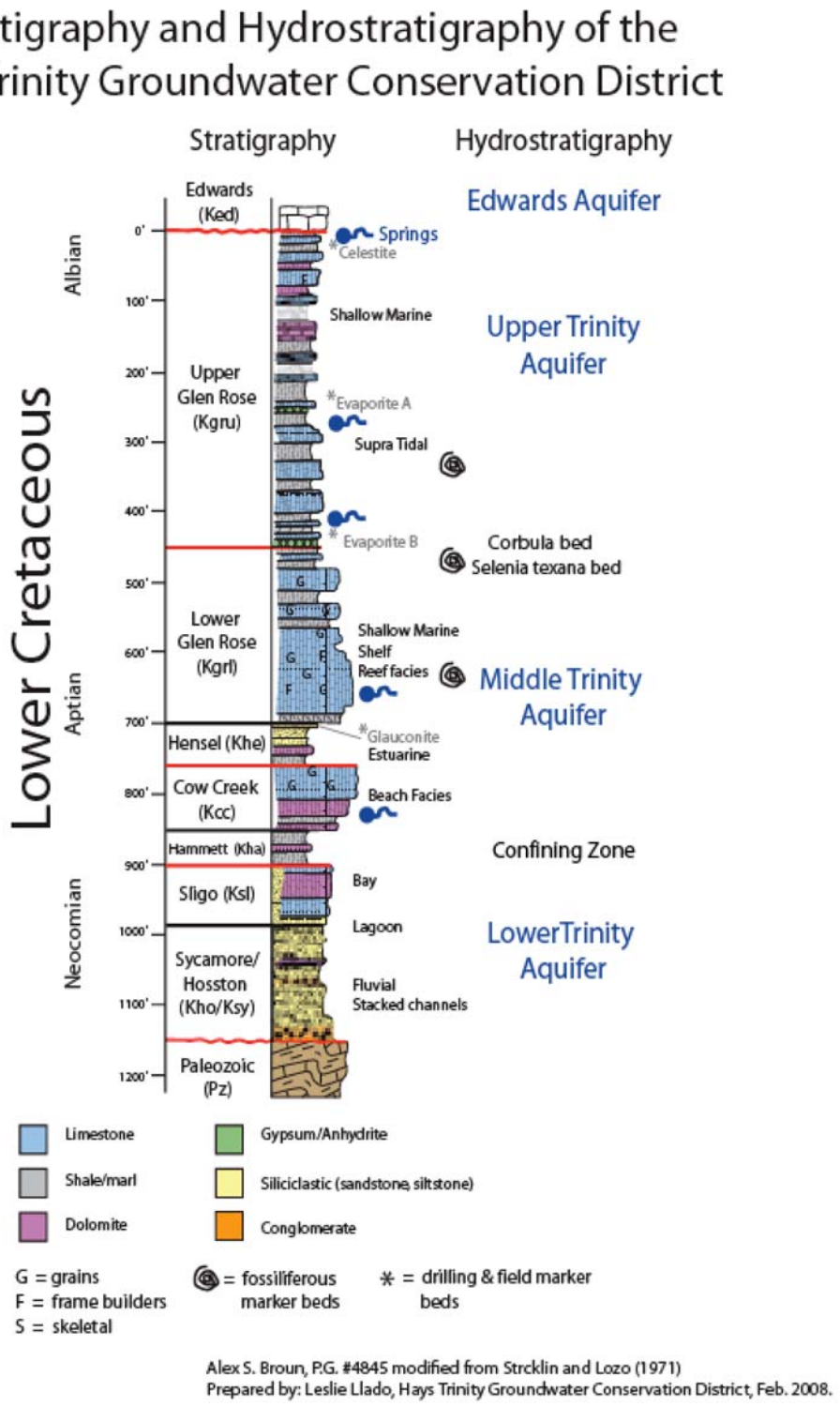


Figure 3. **Stratigraphy and hydrostratigraphy of the Hays-Trinity Groundwater Conservation District.**

interpretation was tied to the outcrop and available literature (Figure 3). Using the interpreted data, a series of three structural cross sections were built, including a profile through Jacob's Well. Local divers contributed invaluable information on the structure of Jacob's Well. Data are continuing to be developed on the groundwater flow regimes in the watershed.

Structural Cross Section A to A'

This roughly southwest-northeast cross section is a strike-line parallel to the structural strike and the major faults of the Cypress Creek Drainage (Figure 4). It is constructed perpendicular to Cypress Creek and intersects section B to B' at the Dry Cypress Well. The line of section stays high to the Tom Creek Fault System. Downcutting from the Blanco River exposes the Lower Glen Rose carbonate section just below the Arrowhead Point Well. Upstream and off the line of section both the Hensel and the Cow Creek crop out in the riverbed and along the bank on the high side (hanging wall) of a normal fault. The cross section cuts the axis of a gentle, southeast plunging nose (Cow Creek structure map, Broun and others, 2007) near Ranch Road 2325 and the Rough Hollow fracture zone. The apparent structural dip is generally flat to the northeast approaching Kelley's Well No.1. The Trinity Group lithology and structural style is similar to that described along cross section B to B'. The deepest erosion is at the Blanco River and along the cut of Cypress Creek where the upper reef/mound facies of the Lower Glen Rose is exposed.

Structural Cross Section B to B'

The section profile is constructed down structural dip from northwest to southeast, and generally follows the course of Cypress Creek (Figure 5). The creek valley cuts through the Upper Glen Rose Formation and exposes the Lower Glen Rose soluble carbonate section. Karstic features are evident as sink holes, caves, Jacob's Well, the dry Cypress Creek bed, and surface joint sets providing conduits for groundwater recharge. Seeps of water from the base of limestone cliffs lining the creek bed are common. Structural dips are gentle, less than 2 degrees to the southeast. Normal faults, sympathetic to the major northeast-southwest trending Balcones Fault Zone, cut the section in the Cypress Creek Valley. The Tom Creek and the Wimberley Fault Systems, at the western edge of the Balcones Fault Zone, drop the Lower Cretaceous interval by 350 to 400 feet to the southeast. Joint sets perpendicular to the strike of the fault systems are structural controls for surface streams and pathways for aquifer recharge.

The Lower Glen Rose Formation is identified in the subsurface and in surface outcrop by an upper and a lower rudistid reef/mound buildup. Reef-core and skeletal–detrital reef margin facies provide porous and permeable zones for local, shallow aquifers. The upper reef is an excellent aquifer in the Wimberley Valley fault block. The Hensel Formation (mudstone, dolomite and siltstone), depending on local lithologic variation, may act as a confining unit to the Cow Creek and as a soluble conduit for groundwater transmission. Cow Creek grain limestone and porous, vuggy dolomite are the primary aquifer lithologies for the Middle Trinity in the upper Cypress Creek area. A large, open conduit (about 8 to 12 inches in diameter) can be observed in the Aqua Texas Well No. 23 videotape within the Cow Creek. This interval corresponds to the main

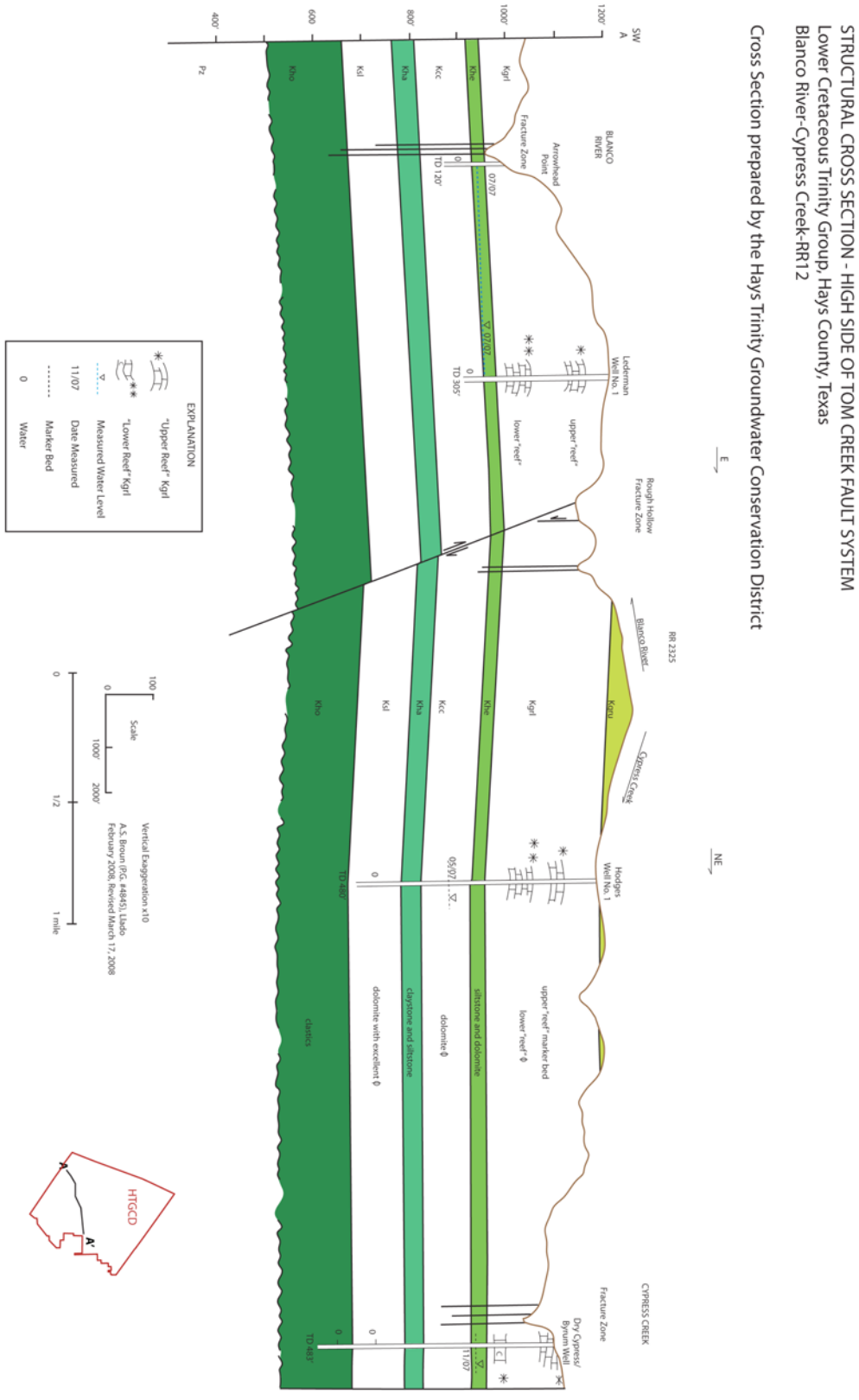


Figure 4. **Structural cross section A to A', high side of the Tom Creek Fault, Lower Cretaceous Trinity Group, Hays County, Texas, Blanco River-Cypress Creek-Ranch Road 12.**

Figure 5a. **Structural Cross Section B to B', Part 1—Cypress Creek Drainage, Lower Cretaceous Trinity Group, Hays County, Texas, South Onion Creek-Cypress Creek-Jacob's Well-Lynd Well.**

Figure 5b. **Structural cross section B to B', Part 2—Cypress Creek Drainage, Lower Cretaceous Trinity Group, Hays County, Texas, South Onion Creek-Cypress Creek-Jacob's Well-Lynd Well.**

cavern passageway elevation in Jacob's Well. Both the underlying Sligo and Hosston (Lower Trinity) contain aquifers along the line of cross section. The porous, vuggy dolomite in the middle Sligo produces at the Dry Cypress/Byrum Well. Interpreted channel sands contain water at several locations in the Hosston. Cross section Ato A' intersects section B to B' at the Dry Cypress/Byrum Well.

Jacob's Well Profile

The northwest–southeast profile depicts the subsurface stratigraphy and karstic nature of Jacob's Well as extrapolated from interpreted geophysical logs in nearby well locations (Figure 6). Particularly useful were the Aqua Texas Well No. 23 and South Golf Course wells (see cross section B to B') and observations and videos from cave divers. The volunteer cave divers have provided invaluable data on the internal structure of the well.

The opening of the spring in the bed of Cypress Creek occurs in the Lower Glen Rose unit of the Middle Trinity Aquifer. The nearly vertical shaft of Jacob's Well probably follows a former fracture or joint set that has been enlarged by solution. Approximately 70 feet below the mouth of the spring is the contact between the Lower Glen Rose and Hensel formations. There are two large caverns at the contact. At 100 feet is the contact between the Hensel and the Cow Creek. The passageway becomes roughly parallel to the horizontal bedding and continues several thousand feet in a paleokarst zone of the Cow Creek. Several smaller tunnels branch off the main shaft. At the current time the divers have mapped in excess of 5,000 feet of passages linked to Jacob's Well. Several passages terminate in constrictions that divers can't proceed beyond; others are still in the process of being fully explored.

Conclusions

Vertical joint sets associated with structural movement along the Balcones Fault Zone shatter the Jacob's Well/Cypress Creek area, providing surficial recharge pathways to subsurface aquifers. The outcropping, soluble Lower Glen Rose carbonate section is the lithologic media for karst development. The porous rudistid reef unit and other skeletal-grain carbonates become selective zones for recent surficial sinkhole and cave development. The normal recharge zone for Jacob's Well is the Cypress Creek drainage basin, with the basin dropping from an altitude of 1,350 to 1,400 feet in the west to 922 feet at Jacob's Well to the east. Karst terrain coupled with fractured, porous Middle Trinity carbonates collect the groundwater in a maze of interconnected conduits and faults. Interstitial water storage provides continuous baseflow of groundwater to Jacob's Well even in dry weather.

The formation contact between the Lower Glen Rose and the underlying dolomite and shale of the Hensel Formation serves as a preferred pathway of flow where conduits develop that may collect and transport groundwater from the Cypress Creek Basin. The contact between the Hensel and underlying Cow Creek may perform a similar function, with the Hensel locally acting as a groundwater confining unit for the lower Cow Creek. Large amounts of groundwater probably move laterally and down gradient through openings in the porous paleokarst Cow Creek carbonates. The porous Cow Creek dolomite, above the underlying Hammett, develops conduits or subsurface passages for groundwater flow. Restricted by the major Tom Creek Fault

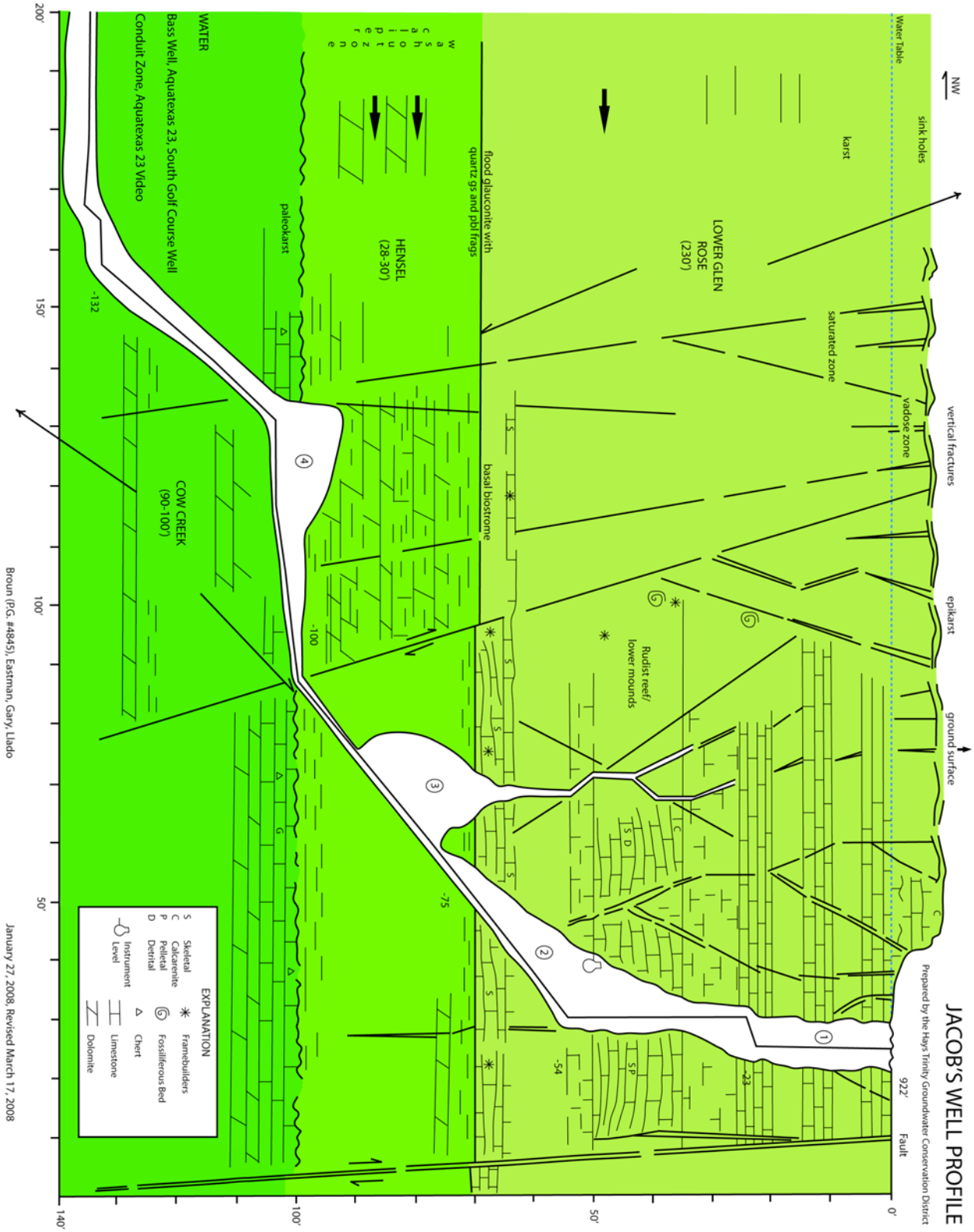


Figure 6. Profile of subsurface stratigraphy of Jacob's Well.

system to the east of the well, which drops relatively impermeable Upper Glen Rose in juxtaposition with the Hensel and Cow Creek members of the Middle Trinity Aquifer, pressure builds and the groundwater moves up fractures and exits as the artesian spring at Jacob's Well. The shattered rocks along the fault trace act as a hydraulic barrier in some zones and as a conduit in others.

Regional fault systems, such as the Tom Creek fault system, may act as a conduit to for the transport water from the Blanco River to Jacob's Well during storm events. Elevated water levels during storm events in the Blanco River may cause groundwater to move over and through the low relief structure that separates the Blanco River and Cypress Creek basins and spills into the "Jacob's Well low" abutting the major fault system.

Selected References Used for Study

Barker, R.A., and Ardis, A. F., 1996, Hydrogeologic framework of the Edwards-Trinity aquifer system, West-Central TX: U.S. Geological Survey Professional Paper 1421-B.

Broun and others, 2007, Geologic analysis of the Trinity Group Aquifer in Western Hays County: Austin Geological Society Guidebook 28.

Collins, E.W., Growth corridor along the Edwards Aquifer, South-Central Texas: The University of Texas at Austin, Bureau of Economic Geology, Map No. 39.

Collins, E.W., Geological Societies Transactions, Vol. XLV.

Collins, E.W., Balcones Fault Zone, Central Texas: Bureau of Economic Geology.

Eastman, R., Jacob's Well Video.

Grimshaw, T.W., 1970, Geology of the Wimberley area, Hays and Comal counties, Texas: Masters Thesis, The University of Texas at Austin.

Kerans, C., and others, 2003, Cretaceous buildups and paleokarst systems, Lake Medina area, South Texas: Field Trip Guidebook, South Texas Geological Society and Gulf Coast Section of SEPM.

Milanovic, P.T., 2004, Water resources engineering in karst: CRC Press.

Palmer, A.N., 2007, Cave Geology: Cave Books.

Perkins, B.F., and others, 1974, Aspects of Trinity Division geology—Geosciences and Man: The School of Geoscience, Louisiana State University.

Stricklin, F.L., Smith, C.I., and Lozo, F.E., 1971, Stratigraphy of Lower Cretaceous Trinity deposits of Central Texas: Bureau of Economic Geology Report of Investigations, No. 71.

Stricklin, F.L., and Smith, C.I., 1973, Environmental reconstruction of a carbonate beach complex—Cow Creek (Lower Cretaceous) Formation of Central Texas: Geological Society of America Bulletin, v. 84.

Acknowledgments

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note

Austin Geological Society: Early History and Recollections

James W. Sansom, Jr., P.G., and Ernest T. Baker, Jr., P.G.

Austin American-Statesman

Sunday, June 19, 1966

HAROLD D HOLLWAY
President

ERNIE T. BAKER
Secretary

JAMES W. SANSOM JR.
Vice President

MISS ROSELLE GIRARD
Treasurer

Austin Geology Society Chooses New Officers

Harold D. Holloway, head of the groundwater section in the hydrology planning division of the Texas Water Development Board, has been elected president of the Austin Geology Society. He will serve for a year ending in May 1967.

Other new officers of the society are James W. Sansom Jr. of the Water Development Board, vice president; Ernie T. Baker of the U.S. Geological Survey, secretary; and Miss Roselle Girard of the University of Texas Bureau of Economic Geology, treasurer.

The society is composed of approximately 95 members draw from the University of Texas, state agencies such as the Railroad Commission, General Land Office and other, and the US Geological Survey. It was organized in April 1965 and the first president was Dr. Peter T. Flawn, director of the UT Bureau of Economic Geology.

The society meets twice monthly, once at a luncheon and a second time in night session at which guest geologists speak or present scientific papers.

The Austin Geological Society began in April 1965 when a small group of geologists including Harold Holloway and James W. Sansom, Jr., of the Texas Water Development Board and Ernest T. Baker, Jr. and Al Winslow of the U.S. Geological Survey met to promote better professional communication among geologists in the Austin area. Bylaws were collected from several local geological societies around the state to assist in formulating one for an Austin Society. A meeting was arranged with faculty at the University of Texas Department of Geology to discuss the idea of starting an Austin Geological Society. Both Dr. Sam Ellison and Dr. Steve Clabaugh were interested. They encouraged us to proceed, and we asked Dr. Peter Flawn to be our first president. He agreed to do so and, six months later on October 7, 1965, the organization was officially founded with the adoption of a constitution and bylaws. The other officers for our first year in 1965-66 were Harold Holloway, Vice-President; James W. Sansom, Jr., Secretary; and Ernest T. Baker, Jr., Treasurer. All of the original four were officers over the next few years. Holloway was President in 1966-67, Baker in 1968-69, and Sansom in the 1972-73. A copy of the Austin American-Statesman article of June 19, 1966, that announced the incoming officers for the society for 1966-67 is included.

The society was initially operated on a shoestring budget. Meeting announcements were hand delivered to agencies where they were posted on bulletin boards. In 1968-69 a monthly newsletter was initiated by President Ernest T. Baker, Jr. The Society's proposed budget for 1975-76 included $475 for printing and mailing our monthly newsletter. In this brief newsletter, we listed new technical projects of interest by our local geologists as well as new publications. The total money

estimated to be taken in by the Society for 1975-76 was projected to be $2,165.00, and the total disbursement by June 1, 1976, was $1,550.00. The dues at the time were $8.10 for regular members and $4.00 for student members.

The Society's membership rolls ranged from less than 100 to over 100 for the first 15 years and continued to grow through the years since its inception in 1965. For example, we had 84 members in 1966-67 and 180 members in 1978-79.

The Society had various meeting places at different times. Meetings as often as two a month were conducted at first with luncheons at noon and occasional evening meetings with papers presented by professionals in geology or related fields. The long-gone restaurant at the Villa Capri Motel, which was located on the west side of IH-35 north of Manor Road, was one of our first noon meeting sites where it cost $3.16 for meal, tax, and tip. Other meeting places included the Ramada Inn at 300 East 11th Street (now the La Quinta Hotel), Scholz Garden on San Jacinto Boulevard, and Joe C. Thompson Center. Evening meetings were held at the Geology Department on the University of Texas campus. As time went on the Society determined that noon meetings with a meal and a speaker were the best attended. We had occasional field trips and spring parties in the late 1960s and early 1970s at Dr. Steve Clabaugh's lake house on Lake Travis and at the Zilker Clubhouse.

The past officers of the Austin Geological Society from its beginning in 1965 to 1980 were:

Year	**President**	**Vice-President**	**Secretary**	**Treasurer**
1965-66	Peter Flawn	Harold Holloway	James Sansom	Ernest Baker
1966-67	Harold Holloway	James Sansom	Ernest Baker	Roselle Girard
1967-68	Samuel Ellison	Hoye Eargle	Edwin Garner	Wallace Cooper
1968-69	Ernest Baker	Ross Maxwell	Earl McBride	Bruce Fink
1969-70	Gus Eiffler	Carroll Cook	Alan Shield	Cader Shelby
1970-71	Gunnar Brune	Virgil Barnes	Allen Winslow	Peter Stevens
1971-72	Rizer Everett	Allen Winslow	Tom Patty	Jan Knox
1972-73	James Sansom	Tom Patty	Ross Shipman	Ann Bell
1973-74	Bill Fisher	Murphy Hawkins	Rollin Hardin	Lori McVey Ann St.Clair
1974-75	Jean Williams	Rollin Hardin	Jimmy Russell	Peggy Harwood
1975-76	Robert Boyer	Charles (Chip) Groat	Fred Osborne	Sergio Garza
1976-77	Charles (Chip) Groat Sergio Garza	Sergio Garza E.G. Wermund	Robert Sheldon	Fred Osborne
1977-78	E.G. Wermund	Robert Sheldon	Peggy Harwood	Bernard Colley
1978-79	Robert Sheldon	Fred Osborne	Robert Loucks	Victor Baker
1979-80	Fred Osborne	Don Bebout Robert Loucks	Ann St.Clair	Robert Loucks

The Society pulled in members from a wide spectrum. Among the members were geologists, hydrologists, and geophysicists from state and federal agencies, education institutions, consultants, and other entities. Over a span of 15 years, we had representatives from the U.S. Geological Survey's Water Resources Division, the U.S. Geological Survey's Geologic Division, Texas Water Development Board, Texas Department of Water Resources, Bureau of Economic

Geology, University of Texas Department of Geological Sciences, Texas Highway Department, Austin Independent School District, various oil operators, independent geologists, oil companies, Texas Railroad Commission, Texas General Land Office, Governor's Office, U.S. Atomic Energy Commission, U.S. Soil Conservation Service of the U.S. Department of Agriculture, Texas Water Quality Board, University of Texas Department of Academic Affairs, Austin Public Library, Natural Science Center, University of Texas Department of Petroleum Engineering, Southwest Texas State University, Edwards Aquifer Research Center, Texas Parks and Wildlife, Texas Department of Health, U.S. Bureau of Mines, U.S. Bureau of Reclamation, and yes, even the United Nations.

The Austin Geological Society is unique in respect to other local societies around the state. Most of the state's society memberships are predominately from the geologic discipline of petroleum geology. Our Society's membership is diversified as mentioned above. This mixture has given its membership a chance to listen, learn, and meet geologists from different disciplines within our local geological community.

note

How Not To Do a Hydrologic Dye Study, Or, How I Screwed Up Again Without Even Trying

Raymond Slade, Jr.
Junior Hydrologist

1982 1982 1982 1982 1982 1982 1982 1982 1982 1982 1982 1

Happy New Year

1982 1982 1982 1982 1982 1982 1982 1982 1982 1982 1982 1

Friday morning **Austin Americ**

January 1, 1982 ☆☆ Vol. 111 - No. 160

Staff Photo by Zach Ryall

Scientists Raymond Slade, left, and Mike Dorsey begin their red-dye test of Barton Creek.

Barton Creek flows in technicolor

Scientists pour red dye into stream to find out where water goes

By PEGGY VLEREBOME
American-Statesman Staff

Deep in the pristine woods west of Austin on a warm New Year's Eve, the sky was blue, the cedars were green and the water of Barton Creek was hot pink and bright orange.

The color came from a liter of dye deliberately poured into the creek by people who had climbed down a rugged cliff and hiked several hundred yards through the woods.

It wasn't vandalism by early holiday revelers, but an experiment by scientists to try to determine where the water from Austin's favorite creek goes and how fast it gets there.

The scientists — hydrologists, geologists, a chemist and technicians — know that some of the water from Barton and five other creeks seeps through cracks in the creekbeds into an underground limestone formation called the Edwards Aquifer.

They also know that much of the water, especially when Barton Creek is running full, is discharged from Barton Springs into Barton Springs Pool.

Scientists hope the dye will show how long it takes water to travel to Barton Springs, whether the water is filtered as it travels and whether it is diverted to Cold Spring or Deep Eddy Spring, both on Town Lake west of MoPac Boulevard.

The red dye colored the creek pink when it first hit the water, then turned bright orange on the surface and pink underneath as it slowly moved downstream. Project leader Raymond Slade of the U.S. Geological Survey said the dye has been tested and found to be safe.

By the time the dyed water gets to Barton Springs, the dye will be too di-

See Dye, A20

On December 31, 1981, with the best of intentions and permission from all governmental agencies representing Central Texas, Mike Dorsey and I dumped red water-traceable dye into Barton Creek just upstream from the Edwards Aquifer recharge zone. The purpose of the dye dump was to document the time of travel from the injection site to Barton Springs—part of a US Geological Survey study with the City of Austin. An Austin American-Statesman newspaper reporter caught us in the act and published a photo and story of the injection on the front page of the paper's January 1, 1982, issue.

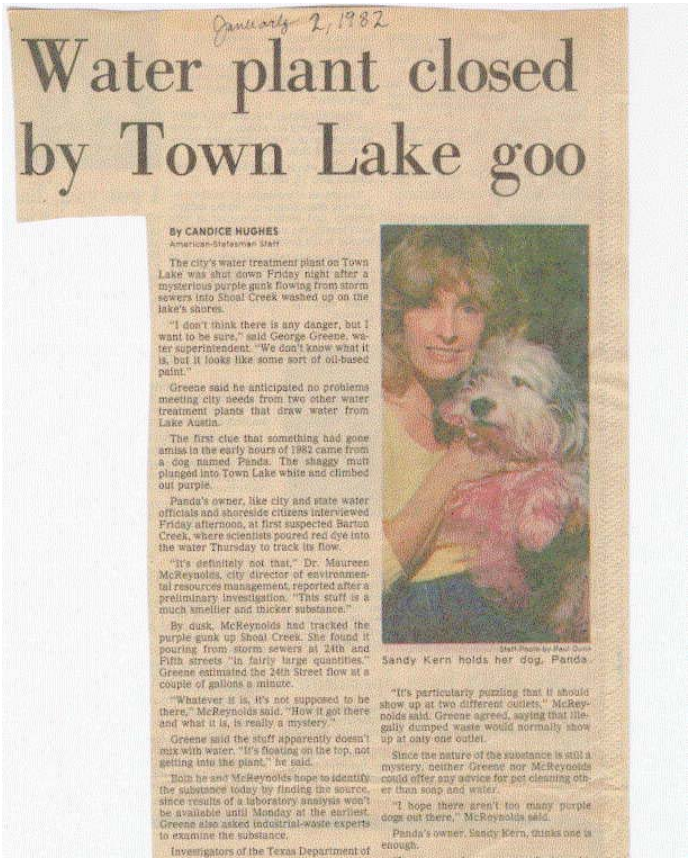
Prior to the injection, I had to offer my life as collateral to several City of Austin officials as a guarantee that the dye would not cause any Austin water bodies to appear as "Big Red" soda. I convinced the officials that the dye would redden water in upper Barton Creek, would disappear into the Edwards Aquifer, and then eventually discharge at Barton or Deep Eddy Springs, diluted to the point where it would be invisible but detectable with instruments.

After dumping the dye I went home with a false sense of security that I knew what I was doing.

On January 1, 1982, I was having a quiet New Years Day lunch at home with family when my phone rang. It was Dr. Maureen McReynolds (Director, City of Austin Environmental Resource Department) who politely informed me that the city had a report that a portion of Town Lake was red in color. Slightly less politely, she then asked why my dye was in Town Lake. I tried to assure her that the "red" in Town Lake was not our dye. She told me the City was sending inspectors to visit and sample Town Lake. I asked her if she wanted assistance, to which she replied "No—you have done enough."

A short time later I received another call from an agitated lady who told me her dog "Panda" had jumped into Town Lake and exited pink in color. She had seen my photo on the front page of the newspaper, looked up my phone number, and wanted to know if my dye would hurt Panda. I thought about denying that I had dumped dye into Barton Creek but the photo on the front page of the newspaper represented a rather large obstacle to that defense, so I told her the same story I told Dr. McReynolds.

A while later, I received a call from an American-Statesman reporter who asked me the same questions I heard from Dr. McReynolds and Panda's owner. I tried unsuccessfully to convince her that I had nothing to do with a red Town Lake.



January 2, 1982

Water plant closed by Town Lake goo

By CANDICE HUGHES
American-Statesman Staff

The city's water treatment plant on Town Lake was shut down Friday night after a mysterious purple gunk flowing from storm sewers into Shoal Creek washed up on the lake's shores.

"I don't think there is any danger, but I want to be sure," said George Greene, water superintendent. "We don't know what it is, but it looks like some sort of oil-based paint."

Greene said he anticipated no problems meeting city needs from two other water treatment plants that draw water from Lake Austin.

The first clue that something had gone amiss in the early hours of 1982 came from a dog named Panda. The shaggy mutt plunged into Town Lake white and climbed out purple.

Panda's owner, like city and state water officials and shoreside citizens interviewed Friday afternoon, at first suspected Barton Creek, where scientists poured red dye into the water Thursday to track its flow.

"It's definitely not that," Dr. Maureen McReynolds, city director of environmental resources management, reported after a preliminary investigation. "This stuff is a much smellier and thicker substance."

By dusk, McReynolds had tracked the purple gunk up Shoal Creek. She found it pouring from storm sewers at 24th and Fifth streets "in fairly large quantities." Greene estimated the 24th Street flow at a couple of gallons a minute.

"Whatever it is, it's not supposed to be there," McReynolds said. "How it got there and what it is, is really a mystery."

Greene said the stuff apparently doesn't mix with water. "It's floating on the top, not getting into the plant," he said.

Both he and McReynolds hope to identify the substance today by finding the source, since results of a laboratory analysis won't be available until Monday at the earliest. Greene also asked industrial-waste experts to examine the substance.

Investigators of the Texas Department of

Staff Photo by Paul Quick

Sandy Kern holds her dog, Panda.

"It's particularly puzzling that it should show up at two different outlets," McReynolds said. Greene agreed, saying that illegally dumped waste would normally show up at only one outlet.

Since the nature of the substance is still a mystery, neither Greene nor McReynolds could offer any advice for pet cleaning other than soap and water.

"I hope there aren't too many purple dogs out there," McReynolds said.

Panda's owner, Sandy Kern, thinks one is enough.

After she hung up, I immediately went into seclusion and waited for the angry mob that was surely on their way to tar and feather me. I also considered leaving the country under false credentials and applying for the Witness Protection Program.

After a restless night of nightmares that my blood would be contributing additional red color to Town Lake, I awoke early the next morning (January 2), and drank a cup of coffee as I read the newspaper. To my shock, on the front page was a photo of pink Panda and its owner. Although it has been many years since this incident, the stains still exist where I spit coffee on the wall opposite my kitchen table.

Additionally, the article stated that "Slade denies that the red Town Lake is from his dye". I received many calls that day—none were flattering. One person stated that the red dog obviously was due to my dye because he compared the photo of Panda's color with the photo of the dye from the previous day's newspaper. I unsuccessfully tried to explain that such evidence was not very scientific.

Late afternoon on January 2, I received a call from Dr. McReynolds—she said she had good news. I responded that I hadn't heard good news for many days. She then informed me that the red liquid existed only in Town Lake near the mouth of Shoal Creek. The inspectors noticed the water in Shoal Creek and adjacent banks also were red, so they followed the red color up the creek where it disappeared at a drainage pipe coming from the basement of a recently abandoned building. Further investigation discovered that the building was recently abandoned by the Austin American-Statesman who had moved to their new location east of Congress Avenue on the south shore of Town Lake. As it turned out, a drum of red printing ink had been knocked over and leaked through a floor drain into Shoal Creek.

Later I received a call from the American Statesman—they apologized for indicating me as the probable source of the red liquid in the lake. With my spirits and confidence restored, I asked if they would print the truth about the dye source so that I could remain living in Austin. They stated they would; however, their article appeared the next day on the back page of the City State section of the newspaper, so I don't know how many people saw it. To this day, I still don't know what happened to the dye from my test; however, I expect any day to receive a call that many red salamanders were found dead at the bottom of Barton Springs. This incident occurred 26 years ago, but my paranoia causes me to believe that some people still blame me for the red Town Lake. Worse than that, I occasionally have the feeling that Panda the red dog is hunting me down to seek revenge.

Town Lake spill traced to old newspaper plant

1/3/82

By KERRY GUNNELS
American-Statesman Staff

The source of a mysterious purple gunk that stained the shores of Town Lake and closed a city water treatment plant was traced Saturday to an overturned barrel of printing ink in the old *American-Statesman* building.

The ink leaked through a floor drain into the city's storm sewer system and flowed into Shoal Creek between First and Second streets, officials of the city industrial waste control department said.

Newspaper officials said the purple ink was petroleum-based and described it as non-toxic. They estimated that 20 gallons escaped before the drain was plugged.

George Greene, city water superintendent, said Saturday the water treatment plant on Town Lake would remain closed until Monday, when EPA toxicity reports on the printing ink would be available.

Greene closed the plant Friday when the origin of the purple substance was unknown. City residents are being served by two other water treatment plants that draw from Lake Austin.

Reports Friday evening that the purple substance also was flowing from storm sewers at 24th and Fifth streets turned out to be erroneous, attributed to the darkness.

Carol B. Cook, environmental health specialist for the Austin-Travis County Health Department, said the spill did not pose any special health hazards.

The unoccupied *American-Statesman* building at 308 Guadalupe was sold last summer, but the new owners have not taken possession.

The newspaper's general manager, Clayton Frink, Saturday accepted responsibility for the cleanup.

"Apparently, ink that used to belong to us somehow found its way into Shoal Creek and Town Lake and we're very, very sorry," Frink said. "If the city will tell us the best way to clean it up, we'll do it."

Allowing such a material to escape into the sewer system is a violation of the city's industrial waste ordinance, but Cook said no decision had been made to file charges.

note

Gravity—A Personal Encounter

C.M. Woodruff, Jr.

I got my start as a "professional" geologist (that is, paid for services) in a job with the Tennessee Division of Geology back in the summer of 1966. I had a brand-new B.A. degree and plans to start graduate school in the fall. Astonishingly enough, that first job was in Geophysics! I drove around the state with a Worden gravimeter, collecting raw data for a statewide gravity map (Johnson and Stearns, 1967). Because gravimeter readings are highly sensitive to both elevation and latitude, I always tried to set up the instrument at a U.S. Geological Survey (or Tennessee Valley Authority) benchmark. This often meant making readings (and making a spectacle of myself) in public places: Courthouse squares, major crossroads, in front of country stores in small Tennessee hamlets, and the like.

Unlike Texas, with its long history of interactions among the geologic profession, petroleum production, and big money, Tennessee never has had the importance of geology imprinted on the public mind. Or, if the discipline is thought of at all in Tennessee, the connotations are mainly negative, given that State's role in the Scopes Trial. Nonetheless, Texas and Tennessee share common traits among much of their rural populaces. These include suspicion regarding strangers, orneriness, and widespread senses of humor that might be described as somewhat perverse. Given these conditions, I enjoyed many "interesting" encounters with local folk, such as when I would pull up in front of a feed store at midday with the open gallery of the store occupied by an array of men seated on split bottom chairs or cola crates, whittling, chewing tobacco, and shooting the breeze. You can imagine the response from such a crowd when a stranger—a mere boy—would drive up and park in front of the store, get out of his car with a white can that looked like a lard stand, beat around in the kudzu until he located the bench mark, then remove from the can a shiny instrument that looked like a high-tech coffee percolator, put the device on an aluminum leveling dish, peer through an eyepiece, twist a knob, write a number in a little brown book, repack the device, get back in the car, and drive away.

Only you could never just "drive away". You would always be called upon to account for your actions, and at that age, I had yet to learn the art of "creative evasion". I mean, the truth was difficult to assimilate. "A gravity survey?" "For the State?" "Boy, what the hell you doing here?"

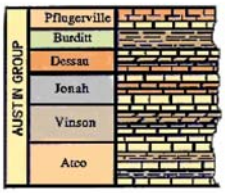
One such encounter stands out in my memory. An old gentleman accosted me from his seat high on a John Deere tractor while I was kneeling down, working the device at a benchmark near the intersection of two county roads. Turning the vernier dial, I was dreading the conversation that was fated to follow. When I had recorded the data and was securing the instrument, he hailed me and said, "What are you looking down in the ground for?" I replied, "I'm not looking down in the ground. I'm running a survey for the State. Uh, I'm measuring the gravity." He pondered that for the better part of a minute, and then opined, "I don't reckon you'll find any of that around here."

And I said, "Well, you've got a little of it everywhere." To that he replied with a truly inspired question: "Son, you ain't going to tax it are you?"

I've thought about that a lot since, especially how it would be when you got your end-of-year property tax, with a prorated surcharge for gravity usage. And what would happen if you were delinquent with your tax bill and they had to cut you off?

Reference

Johnson, R.W., Jr., and Stearns, R.G., 1967, Bouger gravity anomaly map of Tennessee: Tennessee Division of Geology (in cooperation with the Tennessee Valley Authority); contour interval = 5 milligals; scale = 1:500,000.



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Water Quality Issues for Barton Creek and Barton Springs by D. A. Johns, Field Trip Leader. Guidebook to field trip containing road log of eight stops, excerpts from the report of the Barton Springs Task Force to the Texas Water Commission, and five articles on Barton Creek and Barton Springs. Guidebook 14, 1991, 95 p. **AGS 014, $15.00**

Edwards Aquifer–Water Quality and Land Development in the Austin, Texas, Area by D. A. Johns and C. M. Woodruff, Jr. Includes six articles and a road log to six stops in the Austin area. Guidebook 15, 1994, 66 p. **AGS 015, $10.00**

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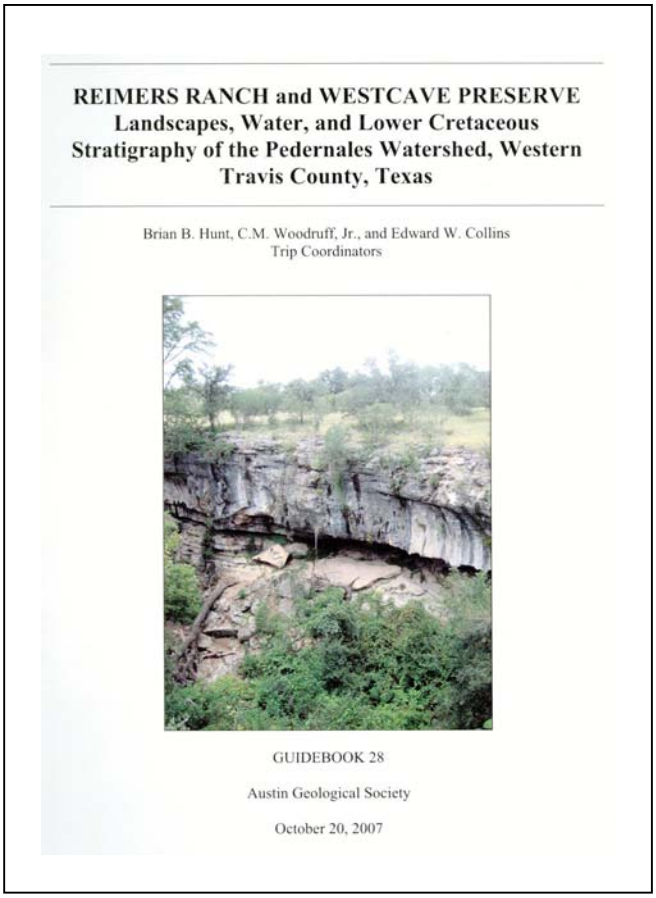
Reimers Ranch and Westcave Preserve—Landscapes, Water, and Lower Cretaceous Stratigraphy of the Pedernales Watershed, Western Travis County, Texas, by B.B. Hunt, C.M. Woodruff, Jr., and E.W. Collins, 2007, **AGS GB 28**



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Ann St. Clair
Elspeth Steinhauer
Cheryl Stevens
Susan P. Synatschk
Ephraim Taylor
Girish Tembe
Stephen Thompson
Scott A. Tiller
Scott Tinker
Donald Tomlinson
Peter Trabant
Robert J. Traylor
Ramon Trevino
Dennis Trombatore
Mead Turner
Matt Uliana
James R. Underwood
Shane Valentine
Joe J. Vickers
Shirley Wade
Timothy Walter
Gilbert Ward
Joshua L. Ward
Benjamin Warden
Leslie P. White
Philip White
Jerry Wiek
Douglas A. Wierman
Charles R. Williams
Philip Winsborough
Brad Wolaver
Corinne Wong
Constance M. Wyman
Rosemary Wyman
Xianjin Yang
Stephen C. Young
Laura Zahm
Mark Zell

Austin Geological Society Membership Application:

Please enroll me in the Austin Geological Society as (check one): *Date:* _____

- O Renewal Active Member ($20 dues/year)
- O Renewal Student Member ($5 dues/year)
- O New Active Member ($20 prior to November, $15 Nov.-Jan., $10 Feb.-April, $5 May-July)
- O New Student Member ($5 prior to November, $3.75 Nov.-Jan., $2.50 Feb.-April, $1.25 May-July)

• *Name*: _____

Renewing Members:

- O Check here if your previous year membership information in AGS files is current. If your information is current, you do not need to fill out the rest of the form.

New Members or Renewing Members With Changes:

• *Telephone*: (Office)_____(Home)_____

• *Mailing Address*:

Street or box: _____

City:_____ Zip: _____

• *Email Address*: _____

- O Check here if you would prefer having the AGS Newsletter emailed to your email account.
- O Check here if you do not want meeting notices emailed to your email account.
- O Check here if you do not want your email or mailing address releases to other geological entities.

• *Background:*

Employer: _____

College Education (degree and field, year, school):_____

_____

Present Focus*:* _____

Disciplines of Interest: _____

Mail this form and payment to:
Treasurer, Austin Geological Society, P.O. Box 1302, Austin, TX 78767-1302

We invite you to become a member of the Austin Geological Society and share in our programs. Your membership will bring you:

- notice of AGS meetings with speakers.
- notice of AGS field trips to sites of geological interest.
- social gatherings of geological professionals in the Austin area.
- a monthly newsletter to keep you informed of Society and regional news of interest to geologists.
- the opportunity to become acquainted with other geologists in the Austin area.

The requirements for membership are:

- To be eligible for Active Membership, an applicant shall have a degree in geology from a recognized college or university, or the equivalent experience, or have been actively engaged in the application of geology or related scientific or professional work for a minimum of two years.
- Consideration of Honorary Membership shall be based on continued dedication and service to the Austin Geological Society. Honorary members shall be selected by the Executive Board. Any Active Member may submit the name of an individual to the Executive Board for consideration as an Honorary Member.
- Any person who is a student in good standing, studying for a degree in geology or related science, is eligible for Student Membership. Student Members shall not be eligible to vote or hold elective office.

AUSTIN GEOLOGICAL SOCIETY

CONSTITUTION

Approved October 7, 1965
Revised December 21, 1990
Revised August 14, 1995
Revised May 1, 2000
Revised August 27, 2007

ARTICLE I

Name and Objectives

Section 1. This organization shall be named "Austin Geological Society."

Section 2. The objectives of the Society are:

(1) to stimulate interest in and promote advancement of geology;
(2) to facilitate discussion and dissemination of geologic information;
(3) to encourage social and professional cooperation among geologists and associated scientists;
(4) to maintain a high professional standing among the members; and
(5) to enhance public understanding of the professional activities of the members.

ARTICLE II

Membership

Section 1. The members of the Society shall consist of persons concerned with the science and practice of geology.

Section 2. Various classifications of memberships and qualifications thereof shall be established by the Bylaws of the Society.

ARTICLE III

Government

The government of the Society shall be vested in five (5) elected officers and an Executive Board. The composition of this government, the manner of selection, the terms of office, the specific duties, responsibilities, and other matters relevant to such bodies and officers shall be as provided in the Bylaws of the Society. Any responsibility and authority of government of the Society not otherwise specified in these governing documents shall be reserved for the Executive Board.

ARTICLE IV

Amendments

Amendments to this Constitution may be proposed at any time by petition signed by at least 20 percent of the Active Members or by the Executive Board. Adoption of such amendments shall be by ballot in which approval is given by at least three-fourth of the total number of Active Members. There shall be an intervening Regular Meeting before the balloting and subsequent to the submission of the amendment.

ARTICLE V

Dissolution of Society

In the event it should be deemed advisable to dissolve the Society, all assets at the time of dissolution shall be donated to a worthy geologic cause, as selected by the Executive Board.

ARTICLE VI

Bylaws

The Bylaws, consisting of six (6) articles as appended hereto, are adopted and may be amended, enlarged, or reduced as provided in the Bylaws.

AUSTIN GEOLOGICAL SOCIETY

BYLAWS

ARTICLE I

Membership

Section 1. The membership of this organization shall be made up of Active, Honorary, and Student Members.

(1) To be eligible for Active Membership, an applicant shall have a degree in geology from a recognized college or university, or the equivalent experience, or have been actively engaged in the application of geology or related scientific or professional work for a minimum of two (2) years.

(2) Consideration for Honorary Membership shall be based on continued dedication and service to the Austin Geological Society. Honorary members shall be selected by the Executive Board. Any Active Member may submit the name of an individual to the Executive Board for consideration as an Honorary Member.

(3) Any person who is a student in good standing, studying for a degree in geology or related science, is eligible for Student Membership. Student Members shall not be eligible to vote or hold elective office.

Section 2. Any member who is in arrears of dues or legally incurred indebtedness to the Society shall be suspended from the Society. The Executive Board shall restore former membership status to any such suspended member when the indebtedness has been liquidated.

Section 3. All Active, Honorary, and Student Members shall be guided by the highest standards of business ethics, personal honor, and professional conduct. Any member who, after proper investigation by the Executive Board, is found guilty of violating any of these standards of conduct may be admonished, suspended, allowed to resign, or expelled from membership at the discretion of the Executive Board.

Section 4. Applicants for membership shall submit an application and dues to the Treasurer. Membership applications shall include the following information:

(1) Professional affiliation,
(2) Education, and
(3) A statement of how the prospective member qualifies for membership.

New members shall be announced in the next newsletter and introduced to the Society at the next meeting.

ARTICLE II

Dues and Special Assessments

Section 1. The annual dues for Active Members and Student Members of the Society shall be established at the beginning of each administrative year by the Executive Board. Dues shall be payable on or before November 1 each year. No dues shall be required of Honorary Members.

Section 2. Dues for new members who join the Society after the beginning of the administrative year shall be prorated according to the quarter of the administrative year.

Section 3. Members who are in arrears for dues and/or special assessments for a period of three (3) months shall be deemed suspended and may be dropped from the rolls at the discretion of the Executive Board. Such former members may be reinstated by the Executive Board upon payment of dues and/or special assessments in arrears plus a reinstatement fee of 25 percent of the amount owed.

ARTICLE III

Officers

Section 1. The officers of this organization shall be the President, President-Elect, Vice-President, Secretary, and Treasurer. The tenure of these officers shall be one (1) administrative year.

Section 2. The duties of the President shall be to preside at all meetings, call Special Meetings, appoint such committees as are not provided for in the Bylaws, and, jointly with the Secretary and Treasurer, sign all written contracts and other obligations of the Society. The President shall assume the duties of Chairperson of the Executive Board and supervise the business of the Society. The President

shall also be responsible for making arrangements for a meeting place for Regular Meetings and providing for an annual audit of financial records.

Section 3. The duties of the President-Elect shall be to participate in Executive Board meetings and serve as understudy to the President. The President-Elect will assume the office of the President the following year. The President-Elect shall also serve as Chairperson of the Election Committee.

Section 4. The duties of the Vice-President shall be to assume the office of president when a vacancy for any cause occurs and assume the duties of the President during the absence or disability of the President. In addition, the Vice-President shall serve as Chairperson of the Technical Program Committee.

Section 5. The duties of the Secretary shall be to keep the Minutes of all meetings, to attend to all correspondence and press notices, to receive and be custodian of all documents and papers of the Society, and to notify all Executive Board members of each Executive Board Meeting. The Secretary shall also serve as Chairperson of the Newsletter Committee. The Secretary, jointly with the President and Treasurer, shall sign all written contracts and other obligations of the Society and shall assume the duties of the President in the absence of the President and Vice-President.

Section 6. The duties of the Treasurer shall be to receive and disburse all funds as authorized by the Society, to keep accurate accounts thereof, and to submit annually a report of the Treasurer's records for auditing. The Treasurer shall be present or delegate a substitute to be present at each Regular Meeting to collect monies and membership applications. The Treasurer, jointly with the President and Secretary, shall sign all written contracts and other obligations of the Society, and shall assume the duties of the President in the absence of the President, Vice-President, and Secretary.

Section 7. The Executive Board shall consist of the President, President-Elect, Vice-President, Treasurer, and the last available past President. The Executive Board's duties shall be to appoint officers to fill vacancies occurring during the administrative year, except the office of President to which the Vice-President shall succeed; and to have general supervision of the organization.

Section 8. The election of officers shall be held at the Annual Meeting. Nominations shall be made by the Election Committee consisting of the President-Elect and at least two members appointed by the President-Elect. This Committee shall nominate two or more candidates for each elective office to be announced in the Society Newsletter prior to the Annual Meeting. At the Annual Meeting, additional nominations may be made from the floor following the report of the Election Committee. The Election Committee shall be responsible for preparation, distribution, and collection of the ballots at the Annual Meeting, and the tabulation of the results of said balloting. The committee shall present the results

of the balloting to the President of the Society during the Annual Meeting so that the newly elected officers may be presented to the Society. Voting shall be by secret ballot. Ballots shall be distributed during registration at the Annual Meeting and shall be returned to the Election Committee upon completion. If none of the candidates for a particular office obtains a majority of the votes cast, the candidate with the least number of votes shall be eliminated and a second ballot taken. If there is a tie between two candidates, a second ballot shall be taken at the Annual Meeting. If, after the second ballot, there is still a tie, the winner shall be decided by the flip of a coin.

ARTICLE IV

Standing Committees

Section 1. There shall be the following Standing Committees within the Society:

- Publications Committee,
- Technical Program Committee,
- Newsletter Committee,
- Field Trip Committee,
- Membership Committee,
- Web Committee,
- Election Committee,
- Awards Committee,
- Education Committee, and
- AGS Bulletin Committee.

The President shall appoint a Chairperson to those committees not already chaired by an officer. These appointments shall be for one administrative year. The Chairperson of a Standing Committee may, in turn, appoint any additional members in good standing with the Society to his or her committee.
In addition to the aforesaid standing committees, there is the Nominating Committee, as previously set forth in Article III, Section 8, of the Bylaws. The President may appoint any special committees as the Executive Board may authorize.

Any Committee Chairperson or member may be removed and replaced by a new appointee upon majority action of the Executive Board.

Section 2. The purpose of the Publications Committee is to oversee the sale of Society publications and assist in the publication of any other manuscripts or documents the Executive Board may authorize.

Section 3. The function of the Technical Program Committee is to provide a program for the Regular Meetings of the Society and to make necessary arrangements for that program.

Section 4. The function of the Newsletter Committee shall be to prepare and mail a newsletter to serve as an announcement of Society Meetings.

Section 5. The purpose of the Field Trip Committee shall be to organize the Society field trips on a suggested schedule of one in the fall and one in the spring.

Section 6. The Membership Committee shall encourage membership, assist the Treasurer and Newsletter Chairperson, maintain a list of active members, and prepare the Society Directory.

Section 7. The Web Committee shall be responsible for the design and upkeep of the Society Web page.

Section 8. The Awards/Scholarship Committee shall nominate and recommend award and scholarship candidates to the Executive Board.

Section 9. The Education Committee shall be responsible for promoting and facilitating AGS involvement in earth science education in Austin-area schools and outreach to the general public.

Section 10. The AGS Bulletin Committee is composed of an Editor (Chairperson) and an editorial team responsible for the annual publication [of the Society] summarizing significant news and events from the preceding year, including the abstracts of talks given at the monthly meetings. It is also a forum for publication of geoscientific papers and notes of regional interest.

ARTICLE V

Meetings

Section 1. The meetings of the Society shall be of three classes: Regular, Executive Board, and Annual.

Section 2. The Society shall hold at least one Regular Meeting each month from August through April except that, by vote of the Executive Board, additional Regular Meetings may be held or Regular Meetings may be discontinued for a period not to exceed three months. The appropriate time and place for Regular Meetings shall be selected by the President or a delegated Committee.

Section 3. Executive Board Meetings shall be held at such times and places and for such purposes as the Executive Board deems necessary and as announced by the President.

Section 4. The Annual Meeting shall be held during the month of May at a place and time designated by the Executive Board. The purpose of this meeting will be to complete the business of the administrative year and shall include the following order of business:

(1) Report of the Executive Board, the President, the Treasurer, and the Standing Committees. Standing Committees may be considered with the report from the President.
(2) Old or unfinished business.
(3) New business.
(4) Election of new officers.
(5) Program.
(6) Presentation of new officers.

Section 5. The administrative year shall be from August 1 of one year to July 31 of the following year.

ARTICLE VI

Awards

Section 1. The Awards Committee shall submit recommendations to the Executive Board for the Public Service Award, the Distinguished Service Award, and for scholarships to be awarded by the Society.

Section 2. The Public Service Award shall be given to recognize contribution of members to the Society to public affairs and to encourage geologists to take a more active part in such affairs. The recipient shall be a member of the Society, but may be in any class of membership. This award may be given without regard to previous awards. Granting the award in any year shall be discretionary.

Section 3. The Distinguished Service Award shall be given to members who have distinguished themselves in singular and beneficial long-term service to the Society. The emphasis shall be on long-term and, at the same time, meaningful service to the Society. The term singular does not necessarily mean without precedence, but rather that the activity be specific as distinguished from general service. More than one member of the Society may be considered in any one year for the award, but Honorary Members should generally be excluded.

Section 4. Scholarships shall be awarded from an endowed scholarship fund. The Executive Board shall select scholarship recipients from candidates recommended by the Awards Committee. Granting scholarships in any year shall be discretionary.

ARTICLE VII

Amendment to Bylaws

Amendments to the Bylaws shall be made by vote of three-fourths of the Active Members present at any Regular Meeting, provided that due notice of the proposed amendment has been submitted to the members of the Society at least two weeks in advance of the date on which the ballot is taken, and provided a quorum (twenty-five percent of the Active Membership) is present at said meeting.

Photograph of Stop 3 on Reimers Ranch that will look at the Cow Creek and possibly the Hammett Shale Contact.