



7th Annual

Texas Hydro~Geo Workshop 2022



With hands-on experience in
real-world field settings!

In Memoriam

This year's HGW is dedicated to the memory of MJ Gibbons of the Bexar Grotto.

MJ was a lovable curmudgeon who was a tremendous supporter of the Hydro~Geo Workshop, playing the key role in logistics, set up, and tear down.

He is missed for his support and his friendship.

MJ Gibbons

1958 - 2020



we
study



NSS membership offers worldwide caver camaraderie, the NSS Journal of Cave and Karst Studies, and more.

USA
visit us at caves.org

Welcome to the 2022 Texas Hydro~Geo Workshop

The Texas Hydro~Geo Workshop was created to bring students, educators, and practitioners together in a field setting as a hands-on learning experience. Participants will have the opportunity to explore many different techniques for the collection and analysis of data from soil, rock, and water media. The workshop is structured to provide participants with the opportunity to work with leading researchers and practitioners from across the state and nation. Please make sure that you take full advantage of this unique, valuable opportunity.

This event has been made possible by the great generosity of our host, Tom Summers, owner of Cave Without a Name and his wonderful staff, including Mike Burrell, and Mike Cunningham. They are stewards of an outstanding natural treasure – Cave Without a Name. Please treat the cave and property with great respect. We practice a “Leave No Trace” ethic for the event.

The Workshop is not possible without the many countless hours contributed by volunteers from the geoscience and environmental science community.

In addition, we must also thank our many sponsors that have stepped up with both financial support and contributions of in-kind services and equipment. Their involvement has provided a much richer and expanded experience while helping to keep costs low. We have been amazed at the continued interest and response for the workshop; participants travel from across Texas and surrounding states, as well as internationally. We hope you find the event educational and fun. Make sure that you have an enjoyable and safe experience and thank you for coming.

Geary M. Schindel, P.G.
Co-Chair
The Hydro~Geo Workshop Section

Mike Harris
Co-Chair
The Hydro~Geo Workshop Section



Keynote Speaker

Dr. George Veni



Dr. George Veni is the Executive Director of the National Cave and Karst Research Institute (NCKRI) and an internationally recognized hydrogeologist specializing in caves and karst terrains.

Prior to NCKRI, Dr. Veni owned and served as principal investigator of George Veni and Associates, conducting multidisciplinary environmental karst management studies for more than 20 years and has conducted karst research throughout the United States and in several other countries. He has chaired many organizations and conferences and has served as President of the International Union of Speleology since 2017, organizing the International Year of Caves and Karst in 2021 and 2022. He has served as a doctoral committee advisor for geological, geographical, and biological dissertations at five universities in the US and Greece. He has taught karst geoscience courses as an adjunct professor for Western Kentucky University for 12 years and taught karst science and management workshops internationally for NCKRI since 2011.

Dr. Veni has published and presented over 270 papers, including six books, on hydrogeology, biology, and environmental management in karst terrains.

Contests

Field Lunch Contest (Pavilion at noon)

Contest for the best field lunch based on a number of criteria including nutrition, taste, preservation, presentation, and the whim of the judges. Please try to make it field applicable – Spartan may win over a French presentation. A prize will be presented to the winner (and the right to help serve breakfast on Sunday). Winner announced after the Keynote address. Time of Event: Noon - 1pm in the Pavilion.

Rock Identification Contest

Contestants identify a series of rocks. The winner – whomever identifies the most rocks in the least amount of time – will be awarded a prize and bragging rights. Winner announced after the Keynote address. Location J, from 11-12, and 2-3.

Yodeling and Hog Calling Contest

This contest is back by popular demand. The winner(s) of the contest will be awarded a prize along with one year bragging rights as the Champion Workshop hog caller or yodeler. The Contest will follow the Keynote Speaker in the cave.

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Vendors/Exhibitors

Be sure to visit various vendors and displays

Association of Environmental & Engineering Geologists

Bat Conservation International

Eureka Water Probes

Baylor University

Check out Cave Without A Name's Mineral and Gift Shop. Store hours: 10 am - 5 pm

Steering Committee

Geary Schindel	Bexar Grotto of the NSS
Mike Harris	Bexar Grotto of the NSS
Tom Summers	Cave Without A Name
Mike Burrell	Cave Without A Name
Jesse Chadwick	Edwards Aquifer Authority
Alf Hawkins	Environmental Geophysics Associates
Brian Smith	Barton Springs Edwards Aquifer GCD
Eric Holman	Office of Homeland Security
Eric Wolff	DNA Geosciences, Inc.
Jack Sackrider	Westward Environmental, Inc.
Jim Major	Terracon Environmental
Joe Yelderman	Baylor University
Kevin Bryant	Terracon Environmental
Kevin Urbanczyk	Sul Ross University
Marcus Gary	Edwards Aquifer Authority, UT Austin
Mark Dobson	DNA Geosciences, Inc.
Mike Cheng	UT Rio Grande Valley
Mustafa Saribudak	Environmental Geophysics Assoc.
Ron Green	Hydro Geologist
Sriram Madabhushi	Booz Allen Hamilton
Yongli Gao	UT San Antonio Center for Water Research
Pat Roth	Association of Environmental Engineering Geologists

Important Information

Safety Your safety is our most important concern, and we have a module specifically on Field Safety; however, you are foremost responsible for your own safety and wellbeing while at the Workshop. For those not familiar with the site, Cave Without A Name is located in the Texas Hill Country, and most of the property is undeveloped and maintained as a wildscape. Be aware of your surroundings and avoid hazardous plants or animals. Do not walk around at night without a flashlight. Note the **location** of the First Aid Station (H) on the map (page 18). The station is continually operated by John Young.

Fire Ants The pest that you are most likely to come across at the Workshop is fire ants. These imported beauties are very common and well named. Their sting burns like touching a hot poker and can ruin your day. Please watch where you are standing and observe your feet often. Anything that looks like an ant mound is a fire ant mound – give them plenty of room and don't disturb them. To prevent potential bites, don't store food in your tent and keep your tent flaps closed and secure. If bitten, brush ants off with your hands and remove clothing if necessary.

Snakes This region of Texas is one of the few areas of the country home to all four types of venomous snakes – rattlesnakes, copperheads, water moccasins, and coral snakes. They are not aggressive but should be treated with respect. Point out any snakes to people near you and a volunteer or Module instructor as soon as possible. There is no upside to handling these animals, so don't try to pick them up or play with them – even dead ones can bite. Leave all snakes alone.

Mammals Other hazards in the area may include skunks, raccoons, porcupines, deer, wild hogs, and the rare mountain lion. While it is rare that you will see any of these animals, please give them plenty of room if you do.

Water The water in the campground is non-potable (NOT drinkable). **BRING DRINKING WATER.** Please try and minimize the waste of water. Reusable cups and water bottles are mandatory. Strenuous fieldwork may require as much as one gallon per day.

Heat and Hydration Heat and sun exposure are also a common problem. Drink plenty of water and stay hydrated. Watch for signs of dehydration: if you're not urinating regularly, if your urine is a dark color, or if you develop a headache or dizziness. Seek shade and let a volunteer know. We will try and get you hydrated before it turns into heat exhaustion or heat stroke. Heat-related problems can be minimized by wearing a hat, thin, loose-fitting clothes, and use shade when available and drink plenty of water.

Recommended Items Bring a folding chair for use at some modules, eating, and at your campsite. In addition to regular camping equipment, bring a flashlight, field book for note-taking, pencils and pens, a small ruler or scale, and calculator. Be prepared for hot, cold, wet, or dry weather.

Food There will be a Food truck on-site for Friday dinner and Saturday lunch. CASH ONLY; please note there is no ATM on-site. Breakfast on Saturday and Sunday is provided, as is dinner on Saturday night. If you bring a field lunch for Saturday, there will be a lunch contest for the best prepared, presented, and unique lunch. Also, **BRING REUSABLE PLATES, CUPS, AND UTENSILS** for meals. Washing stations provided with soap are set up at the Pavilion.

Sanitation Please use the portable toilets. They are cleaned and stocked daily. Be careful with your phones and car keys when using the toilets. The liquid will stain most items brown, yellow, or blue. Anything you drop in the toilet is your responsibility to fish out – if you want to. Please don't throw cans or bottles into the toilets. Hand sanitizers are strategically placed around the site for your use.

Camping Cave Without A Name has made their property available at no cost to the Workshop. We're trying to crowd a lot of happy campers into this finite spot. If your group spreads out too far, you will have people camping amongst you. Don't stake out more space than you need. Please extend a hand and be aware that we're all part of a close-knit family working in the geosciences. Share your campsite with others and trade experiences about your school and program. The Campground Marshall will be the final arbitrator to address any issues.

Behavior We have a strict *No Drama* policy and expect participants to behave professionally during the entire workshop. If you have a High Maintenance personality, consider not attending (if in doubt, ask your friends or professors). Everyone is encouraged to have fun but obey Texas state laws. There are private residences on Cave Without A Name property; please be respectful of their privacy and don't approach them unless invited. If you have any concerns, see the Campground Marshall. Please be kind and understanding as we work through any issues that may arise. Treat all volunteers with respect, they are cooking your food, cleaning John's, and herding cats. If you are abusive to volunteers or other participants, or a danger to yourself or others, we reserve the right to ask you to leave or have you removed from the property. No guns or fireworks allowed. Remember, this is a rural county, and we're friends with the sheriff. He is a nice guy and provides free accommodations at the Cross Bar Hotel, complements of Kendall County taxpayers. On-site speed limit is 3.14 mph.

Alcohol Policy The Hydro~Geo Workshop recognizes that the use of alcoholic beverages by those of legal age is a matter of personal choice. However, students in attendance may ultimately be governed by the policies of their higher education institution. We require that those who choose to drink on the Cave Without A Name grounds while attending the Texas Hydro~Geo Workshop abide by state law, and expect that such individuals will conduct themselves responsibly, mindful of the rights of others. Campground Marshals reserve the right to request that law enforcement remove anyone in violation of the above requirements. No alcoholic beverages will be served or sold in conjunction with the Hydro~Geo Workshop.

Waste If you brought it with you, take it home. This includes all of your trash.

Module Descriptions

Basic Outdoor Skills

Field Safety

1 hour / Limit 15 participants / Location H

Considering field work may be in remote locations and in weather extremes, this Module discusses issues ranging from safety, personal hygiene, common first aid issues in the field, wild animals, weather, dehydration, being stranded overnight, personal locator beacons, and wild or stupid people. Presented by John Young, paramedic, safety and rescue expert, Bexar Grotto.

Camping – A Field-Camp Survival Guide

1 hour / limit 15 participants / Location H

If you plan to attend summer field camp or camping related to field trips, this is your module. We will discuss tent types, sleeping bags, and pads, how to set up, take down, and store your gear, and types of boots commonly used in camping/hiking/field work. If you're going to be car camping, there are some other items which you'll find convenient to bring such as a folding chair. We'll also discuss where to find the gear and get expert advice. Presented by Jason Rodriguez, Garry White, Mike Polemo, and Kathy Lee, Bexar Grotto of the NSS.

Know Not No Knot – Knots for Every Occasion

1 hour / Limit 8 participants / Location B

Knots have multiple uses in the outdoors, From lashing your gear to a pack, setting up you tent, hanging a bear bag in a tree, etc. This module will show how to tie several basic knots: Square, Sheet Bend, Bowline, Figure Eight family, Clove Hitch, and Tautline Hitch. Ropes are provided. Presented by Garry White, Bexar Grotto of the NSS.

PREREQUISITE: You need to be able to tie your own shoes. If you haven't mastered the shoe knot, most of these knots will be way over your skill level.

Field Techniques and Career Development

Developing Scientific and Field Notebooks

2 hours / Limit 20 participants / Location A

Instructions and guidance on the preparation of scientific and field notebooks. Using well-documented and comprehensive notebooks to support analysis, laboratory experiments, and field surveys will greatly facilitate successful completion of modest-sized to the most complex projects. Well-prepared and documented notebooks will also provide defensible records for future recall and to support quality record management. This Module will provide hands-on guidance and suggestions to the preparation of defensible and useful documentation. Presented by Rick Klar, Raba Kistner Environmental and Ronald Green.

Field Instruments (map, compass, rock hammer)

2 hours / Limit 25 participants / Location 6

Participants will utilize maps and Brunton Compass to collect basic data including location, strike and dip, basic field surveying, sample collection, and descriptions. Presented by Grant Snyder, GLS Solutions, Inc., and P.B. Snyder, Lamar University.

FLIR Infrared Camera and Radon Analysis

1 hour / limit 15 participants / Location L

The use of a FLIR infrared Camera will be demonstrated. The camera can be used to find cave entrances, springs discharging below stream surfaces, and contrast between different soil types, depth to bedrock, etc. Presented by Joe Yelderman and Stephanie Wong, LRE Water.

ESRI Field Maps for ArcGIS Mobile App

2 hours / Unlimited participants / Location 17

Participants will be introduced to Field Maps for ArcGIS, a mobile app offered through ESRI software. Participants must bring an Android or Apple mobile device (including smart phones and iPads) to participate. This program is becoming the standard for field data collection, including locational data, observational data, and photo documentation. Presented by XXX

NOTE: The free app can be downloaded beforehand from <http://www.esri.com/products/collector-for-arcgis>.

Professional Geologist and Career Development Q&A

30 minutes / 25 participants / Location VR-2

Come ask a working geologist and recent geology graduate on how to start your career development during your undergraduate degree and ask a recently licensed Professional Geologist questions about how and if you should obtain your Professional Geologist license. This is a Q&A session so feel free to come and go. Presented by Alyssa Balzen and Shelby Skittone with the Bandera County River Authority & Groundwater District.

Career Development

1 hour / Unlimited participants / Location VR-2

Come discuss important aspects of career development from the beginning of your academic program through your professional career. This will include the importance of networking, mentors, continuing education, and staying active in your professional association. Presented by various professionals representing various subdisciplines of applied geosciences including: hydrogeology, geophysics, and environmental science. Presented by Pat Frost, Rusty Branch, and Leigh Grover.

Career Opportunities in the Oil & Gas Industry - the Big Picture

1 hour / Limit 15 participants / Location VR-2

Discusses various career opportunities in the oil and gas field include Geology, Geophysics, Petrophysics and Engineering, both now and in the past. Ample time for "Questions and Answers" will be provided. Presented by Tom Fett, Independent Geologist

Well Drilling and Environmental Monitoring

Environmental Drilling, Logging, and Sampling

3 hours / Limit 25 participants / Meet at Location 5 (off-site)

Introduction to environmental sampling of soil using manual methods and drilling rigs. Topics will include an overview of drill rig capabilities, soil sampling methods and equipment, sample collection, soil boring logging and monitoring well installation. Samples will be collected for students to observe and classify. A drilling rig will be on site to demonstrate drilling techniques. The module will be presented by Kevin K. Bryant, Terracon Consultants, Inc. and employees from Vortex Drilling.

MODULE SCHEDULE	HRS	LOC				
			7-9	9-10	10-11	11
Introduction (8:30-9:00)	½	Pav	BREAKFAST			
Field Lunch Contest	1	Pav				
Rock Identification Contest	1	J				
Yodeling Contest	½	CV				
Lightening Talks	¼	Pav				
Keynote Address	1	CV				
Camping – A field-camp survival guide	1	H				
Career Development	1	VR-2				
Career Opportunities in the Oil and Gas Industry the Big Picture	1	VR-2				
Cave Biological Inventory	3	1 (OS)				
Cave Geology	3	CV				
Cave Mapping	3	CV				
Climate Change, the Tipping Points of No Return	1	19				
Developing Scientific and Field Notebooks	1	A				
Electromagnetic surveying to locate caves and voids	4	2				
Environmental Drilling, Logging, and Sampling	3	5 (OS)				
ESRI Collector for ArcGIS Mobile App	2	17				
Field Instruments (map, compass, rock hammer)	2	6				
Field Safety	1	H				
Field Trip to a Wild Cave	3	7 (OS)				
Field Trip to Herff Falls at Cibolo Preserve (Sunday)	4	1 (OS)				
FLIR Infrared Camera and Radon Analysis	2	L				
Freshwater Fish, Mussel, & Aquatic Sampling Techniques	3	4 (OS)				
Ground Penetrating Radar	2	8				
Groundwater Conservation Districts	3	11 (OS)				
Groundwater Investigation Methods	4	C				
Herpetological Field Survey Techniques	2	9				
High Resolution 3D Resistivity Imaging	3	9				
Karst Feature Evaluation Using the TCEQ Forms	3	12				
Know Not No Knot - or Knots for Every Occasion	1	B				
Low Impact Development	1	13				
Macroinvertebrates as Water Quality Indicators	3	14 (OS)				
Microgravity Instruments & Surveying to Locate Caves & Voids	4	13				
Mini Exploration and Reserves Analysis	2	20				
Potentiometric Surface Mapping	2	18				
Professional Geologists and Career Development Q&A	½	VR-2				
Rock Identification	1	J				
Safety in the Vertical Environment	2	H				
Stalagmites as Paleoclimate Archives	2	G				
Stream Gauging	3	15 (OS)				
Surface Geophysics (Natural Potential)	3	10				
Surface Water Quality Sampling	2	5 (OS)				
TCEQ's Clean River Program: an Overview	2	21				
Tracer Testing in Karst	4	VSCR				
Water Quality Monitoring with Eureka Manta2 Sondes	2	VR-1				

Meeting Locations: Pav = Pavilion VR = Vendors Row CV = Cave OS = Off-site VSCR = Visitor Center Conference Room

Surface and Borehole Geophysics

Ground Penetrating Radar

2 hours / Limit 20 participants / Location 8

Demonstration of ground penetrating radar (GPR), a commonly used near-surface geophysical method. Information regarding applications, instrument operation and interpreting GPR data will be presented. GPR data will be acquired and interpreted by the participants from both known and unknown features. GPR can be used to detect sinkholes, pipes, archaeological features, graveyards, shallow caves, UST. Presented by Jim Major, Terracon Consultants.

Surface Geophysics (Natural Potential)

3 hours / Limit 20 participants / Location 17

Introduction of the Natural Potential (NP) surface geophysical method for the location of subsurface voids. NP will be conducted over known portions of Cave Without a Name or other karst features to demonstrate how this surface geophysical method is useful in delineating the subsurface in a karst terrain. Mustafa Saribudak and Alf Hawkins, Environmental Geophysical Associates.

High Resolution 3D Resistivity Imaging to Locate Caves and Voids

2 hours / Limit 20 participants / Location 9

Provides hands-on training by deploying the SuperSting resistivity imaging system in high resolution 3D resistivity imaging surveys that are ideal for locating caves, voids, depth to bedrock and other geotechnical targets. Data will be comprised of tightly spaced lines and then inverse modeled with the EarthImager 3D Inversion Software for a quick and accurate representation of the subsurface. 3D models will be rapidly collected with single lines of resistivity data that complete in 7 minutes and data will be displayed in real time on the Android App. Presented by Jason Greenwood and Markus Lagmanson of Advanced Geosciences, Inc. Austin, Texas.

Microgravity Instruments and Surveying to Locate Caves and Voids

4 hours / Limit 8-10 participants / Location 13

A microgravity survey across the surface footprint of Cave Without A Name will be performed using a Lacost and Romburg G-meter along a profile about 200-300 meters in length with a station spacing of 10 – 15 meters. Students will acquire first-hand knowledge of gravity surveying and meter operation. The survey will also entail collecting surface elevations at each station using a traditional beam-level surveying methods. The modules will be presented by Dr. Blake Weissling, Professor at UTSA and Mr. Danny Paulk of L&R meter services who will provide the gravity meter for the workshop.

Electromagnetic (EM) Surveying and Instrument Techniques to Locate Caves and Voids.

4 hours / Limit 20 participants / Location 2

An Electromagnetic survey over the area of the Cave Without a Name will be performed using a Geonics EM34-3XL. The EM34-3 tool has been shown to be an effective tool to delineate caverns and karst features. The students will acquire hand-on knowledge of EM surveying and equipment operation. EM data will be collected at both 40 meter and 20 meter spacings and in both the Vertical and Horizontal Dipole configurations. The data will be interpreted using the Golden Software Surfer Program. As the EM survey is often used in conjunction with the 3D Resistivity tool, it is proposed to use the same survey lines as the High Resolution 3D Resistivity survey. This will allow for a comparison of the two techniques. The Module will be presented by Michael Jacobs, Geosyntec Consulting, K.C. Singh, University of Texas El-Paso and Jerrika Stark, American University of West Virginia.

Water and Resource Management

Groundwater Investigation Methods

3 / 4 hours / Limit 20 participants / Location C

Introduction to the technologies typically used for groundwater resource investigations. Students will be introduced to: 1) drilling methods, 2) the role of the geologist in the field during drilling, 3) downhole video and electric logging tools (downhole camera, Optical Borehole Imager (OBI), resistivity, gamma, caliper, fluid sampler, and flow tools), and 4) e-log interpretation. There will be a live demonstration of video and geophysical logging in an onsite water well during the Module. Example e-logs will be reviewed and interpreted. At the end of the Module, students will have an opportunity to correlate borehole cuttings and an e-log from a 1150' deep well in West Texas. Presented by Mark Dobson and Eric Wolff, DNA Geosciences, Inc., Ed Miller and Mike Miller, GeoCam, Inc.

Stream Gauging

3 hours / Limit 30 participants / Meet at Location 15 (off-site)

Meets 15 minutes before at the Pavilion to coordinate carpool to Kreuzberg Canyon Natural Area. This Module will introduce students to the fundamentals of stream gauging on the nearby Guadalupe River. Participants will set up a stream transect, measure a stream profile and perform discharge measurements of the river. Participants will use a variety of acoustic velocity meters, incorporating wading and current profiling techniques. Calculated stream flows will be compared to upstream and downstream USGS stream gauges. Participants should bring clothing and sturdy shoes for wading in the river. Presented by Justin Camp and Jeff Watson, Barton Springs Edwards Aquifer GCD; Marcus Gary, Edwards Aquifer Authority..*

Tracer Testing in Karst

4 hours / Limit 20 participants / Meet at Visitor Center Conference Room

Introduces participants to the fundamentals of groundwater tracer test design and execution. This includes field preparation, dye selection, dye injection, water and charcoal packet collection and laboratory and field analysis. Samples will be collected using an automatic water sampler and analyzed in the field using a filter fluorometer. Students will also process charcoal packets and analyze eluant for dye. Presented by Ralph Ewers, Ewers Water Consultants; Brian Smith, Barton Springs Edwards Aquifer Conservation District and Geary Schindel, Karst Works, Inc.

Surface Water Quality Sampling

2 hours / Limit 15 participants / Meet at Location 5 (off site)

Meets 15 minutes before at the Pavilion to coordinate carpool to Kreuzberg Canyon Natural Area, map page 18. This Module will cover water quality sampling. Topics covered will include parameter selection, sampling equipment selection, sample collection, of field parameters (pH, temperature, conductivity, dissolved oxygen (DO), turbidity, and alkalinity), Chain of Custody (COC), packing and shipping samples, and personal protective equipment. Historical laboratory data will be presented and compared to current Maximum Contaminant Levels (MCL). Participants will get wet and should bring appropriate footwear and a change of clothes. Presented by Phil Pearce, Ben Dilly, and Kenadi Sutton, SWCA, Inc.

Climate Change, the Tipping Points of No Return

1 hour / 20 participants / Location 19

This is a presentation on the basic understanding of the reality of Climate Change (Global Warming). But more importantly, show what our grandchildren are facing if we do not act now to this environmental crisis. Presented by Larry White, TA&M, Corpus Christi.

Low Impact Development

1 hour / Limit 10 participants / Location 13

This module will discuss what Low Impact Development (LID) is, why it is important, the different types of LID designs (mechanical and biological), and include some hands-on demos. Presented by Jason Rodriguez, Texas State University.

Groundwater Conservation Districts

3 hours / Limit of 15 Participants / Meet at Location 11 (off site)

This module will provide an overview of the history and role of groundwater conservation districts (GCDs) in the state of Texas, as well as a demonstration of some of the day to day activities that GCD employees perform (well inspections, water level measurements, etc.). The purpose of this module is to present attendees with an account of the history of Texas GCDs and the role GCDs play in regulating and conserving groundwater resources. Micah Voulgaris, and Heath Hoffman, Cow Creek Groundwater Conservation District.

Potentiometric Surface Mapping

2 hours / Limit 20 participants / Location 18

Participants will use synthetic data and create a potentiometric surface map. This is an important first step in conducting a groundwater investigation. The data will be used to calculate the direction of groundwater movement and contaminant transport. Additional data will be presented that will be used to calculate the apparent groundwater velocity in a sand and gravel aquifer. Presented by Yongli Gao, UT San Antonio.

Water Quality Monitoring with Eureka Manta2 Sondes

2 hour / 10 participants / Location VR-1

A hands-on introduction to sensor technologies available for multi-parameter water quality sondes; navigating the multi-probe control software; operating control devices; including a hand-held field PC with Windows Mobile; calibration of pH, conductivity and optical DO, depth and turbidity sensors; spot checking or profiling (site to site) and unattended logging; care and maintenance of water quality sondes; and managing data from real-time telemetry stations. Presented by Joanna Howerton, of Eureka Water Probes.

TCEQ's Clean River Program: An overview

2 hours / Unlimited participants / Meet at Location 21 (off site)

This module is an overview of the physical, chemical, and biological monitoring methods used to assess surface water quality in Texas. The module will discuss and demonstrate methods used for preforming discharge measurements, recording in-site water quality parameters, collecting water sampling, identifying freshwater fishes, and characterizing physical habitat conditions. Equipment to be used/demonstrated including FlowTracker, multi-probe sonde unit, water sample bottles, Electroshocker, Seine net, supporting literature. Presented by Clint Carter and Levi Sparks with the Bandera County River Authority and Groundwater District.

Mini Exploration & Reserves Analysis

2 hours/ 15 person limit/ Location 20

Participants of this module will be guided through the process of evaluating a greenfield property for economic aggregate reserves. Beginning with aerial data to design a simple mine plan, they will log material (provided) from pre-determined boring locations across the site. They will correlate the logs and construct cross sections to get a whole picture of the subsurface. As a group we will create a 3-D model of the site. Considerations such as overburden, waste factors, and statutorily protected areas and buffers will be applied. Each participant will then measure the volumes of each target deposit to calculate potential mine reserves. presented by Jessica Garate, GIT of Westward Environmental, Inc.

Rock Identification

1 hour / Limit 15 participants / Location J

This Module will present methods to identify rocks that are common to Texas and the western United States. Here is a good opportunity to refresh your skills and learn some of the tricks of the trade for field identification. Presented by TBD

Field Biology

Macroinvertebrates as Water Quality Indicators

3 hours / Limit 15 participants / Meet at Location 14 (off site)

This module will introduce students to the fundamentals of stream and pond biomonitoring techniques and includes a survey activity using aquatic macroinvertebrates as water quality indicators. Students will capture and identify macroinvertebrates within provided substrates and use datasheets to calculate and determine water quality. Supplementary discussion topics include: biosurvey methodologies, general aquatic ecology, and applications of survey results. Presenter TBD

Cave Biological Inventory

3 hours / Limit 10 participants / Meet at Location 1 (off site)

The majority of this module will occur within an undeveloped cave. Participants will receive an introduction to commonly encountered cave life, with an emphasis on Texas' cave fauna. Participants will learn basic/ standard methods of cave biological inventory and conduct an inventory within the cave. Presented by Jenny Blair and Tony Blair, Blair Wildlife Consulting.

NOTE: Walk to the cave from the campground. Helmets and lights will be provided. Participants need durable, close-toed shoes, clothes that can get dirty, gloves, water bottle, and FULL change of clothes (including shoes). Participants will need to abide by USFWS WNS decontamination procedures. Heavy duty plastic garbage bags will be provided for dirty clothes.

Freshwater Fish, Freshwater Mussel, and Aquatic/Semi-Aquatic Reptile and Amphibian Sampling Techniques

3 hours / Limit 10 participants / Meet at Location 4 (off site)

Biologists will present an overview of commonly employed freshwater fish, mussel collection, and aquatic/semi-aquatic reptile and amphibian survey techniques in Texas streams and rivers. An overview of the following techniques will be provided: seining and electrofishing for fish, tactile surveys including snorkel and hooka for mussels, and passive and active sampling for turtles, water snakes, and aquatic salamanders. General descriptions of habitats sampled and biology of organisms collected will be discussed followed by an open question / answer period. Presented by Kyle Sullivan and Jeff Jenkerson, Bio-West Environmental Consultants.

NOTE: This will be a hands-on exercise so please be prepared to get wet.

Herpetological Field Survey Techniques

2 hours / Limit 15 participants / Location 9

An introduction to the process of generalized herpetological field survey methods. Module will include discussions of trapping and collection methodology, tool/equipment consideration, specimen identification (visual and auditory where applicable) and hands-on in field survey. Presented by Jenny Blair and Tony Blair, Blair Wildlife Consulting.

Karst and Geologic Evaluations

Cave Geology

3 hours / Limit 20 participants / Meet at Cave Entrance

An introduction to the process of cave and karst geology using Cave Without A Name as an example. Discussions will include cave initiation and destruction, cave formations, caves as part of the geologic record, cave data and climate change, cave hydrology, and methods for cave and karst research. Presented by George Veni, National Cave and Karst Research Institute

Karst Feature Evaluation Using the TCEQ Forms

3 hours / Limit 20 participants / Location 12

Participants will utilize Texas Commission on Environmental Quality (TCEQ) field evaluation forms to document and evaluate karst features. This process is performed on properties being developed on the recharge zone of the Edwards Aquifer. Karst features on Cave Without A Name property will be located and evaluated. Advanced evaluation techniques that complement TCEQ requirements will also be presented. Presented by Phil Pearce, Ben Dilly, and Kenadi Sutton, SWCA, Inc. on Saturday morning and George Veni, National Cave and Karst Research Institute on Saturday afternoon.

NOTE: Participants should arrive with their notebooks, pens, and whatever field equipment they deem useful for evaluating karst features. They should also visit the TCEQ website to download and bring one copy of the TCEQ assessment table (https://www.tceq.texas.gov/assets/public/compliance/field_ops/eapp/F-0585_geologic_assessment_table.pdf), and instructions for geologists (https://www.tceq.texas.gov/assets/public/compliance/field_ops/eapp/F-0585_geologic_assessment_instructions.pdf). Some forms will be available at the Module.

Stalagmites as Paleoclimate Archives

2 hours / Limit 20 participants / Location G

Stalagmites are arguably the best archives of terrestrial climate change over time and as such, have been increasingly utilized for scientific study over the past few decades. This Module will introduce students to the concept of speleothems as recorders of paleoclimate information, with topics covering conservative sample collection, age dating, methods of geochemical analysis, and age model construction. Discussions will include the use of in-situ sampling techniques as well as ways in which to strike a balance between maximizing the information gained from the geochemical analysis of stalagmites and the conservation of irreplaceable cave formations. Stalagmite samples used for paleoclimate reconstructions will be available for the students to examine. Presented by Yongli Gao and Chris Ray, UT San Antonio.

Field Trip to Herff Falls at Cibolo Preserve (Sunday)

4 hours / Limit 9 participants / Meet at Location 1 (off site)

Meets 20 minutes prior to start at the Pavilion to coordinate carpooling. This is a remote location so you will need to drive yourself or carpool with other attendees (preferred) to the Cibolo Nature Center parking lot (140 City Park Rd. Boerne, TX) You may want to be packed so you can leave after the field trip as the location is near Boerne (only if tour is on Sunday).

This Module will visit the Herff Falls, a narrow canyon through a large exposure of caprinid rudist reef, located at Cibolo Preserve. Cibolo Preserve is a 653-acre natural habitat laboratory located just east of Boerne. A uniquely preserved cross-section of history and nature in central Texas, the land is notable for its beauty, variety of flora and fauna, geological features and areas of archaeological interest. One and a half miles of Cibolo Creek bisects the Cibolo Preserve, before entering the Herff Falls. In March 2019 a swallet opened above Herff Falls essentially taking in all flow that historically used to recharge swallets downstream after passing through the falls. In times of low-flow the Herff Falls are dry. Participants should wear proper footwear for walking on the karst surface and bluffs. Presented by Rufus Stephens and Candace Andrews, Trustees of Cibolo Preserve.



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Module Presenters

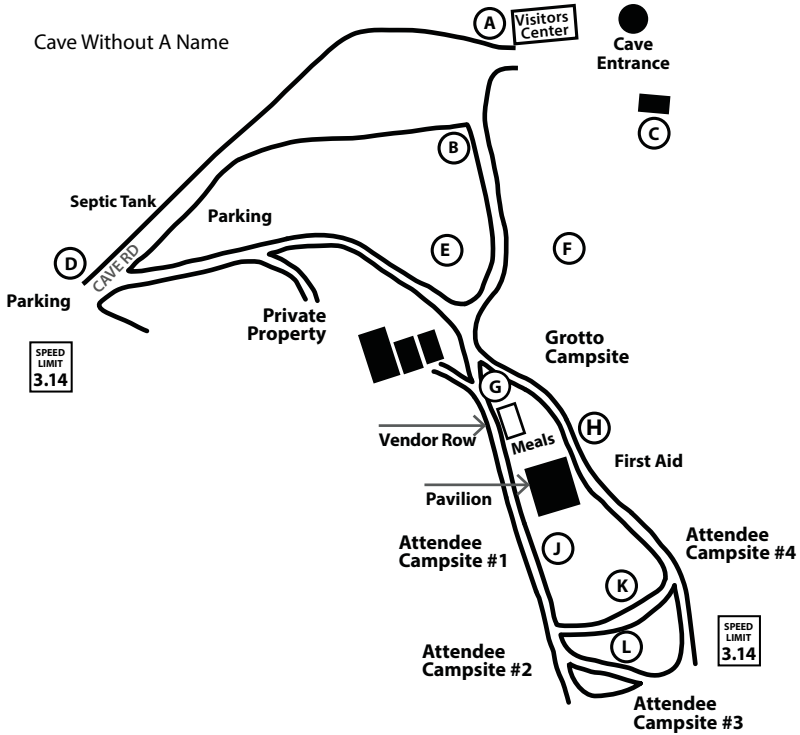
Alf Hawkins	Jason Rodriguez	Kevin Bryant	P.B. Snyder
Alyssa Balzen	Jeff Watson	Kyle Sullivan	Phil Pearce
Ben Dilly	Jeffrey Jenkerson	Larry White	Ralph Ewers
Blake Weissling	Jenny Blair	Leia Hill	Richard Silver
Brian Smith	Jerrika Stark	Leigh Grover	Rick Klar
Candance Andrews	Jesse Chadwick	Levi Sparks	Roger Andrade
Chris Lafferty	Jessica Garate	Marcus Gary	Ron Green
Chris Ray	Jim Major	Mark Dobson	Ross Webb
Clint Carter	Joanna Howerton	Markus Lagmanson	Rufus Stephens
Danny Paulk	Joe Mitchell	Micah Voulgaris	Rusty Branch
Ed Miller	Joe Yelderman	Michael Jacobs	Shelby Scitttone
Eric Wolff	John Casiano	Michael Polendo	Stephanie Wong
Garry White	John Young	Michael Tudor	Steve Gutierrez
Geary Schindel	Jon Cradit	Mike Harris	Tom Fett
George Veni	Justin Camp	Mike Miller	Tom Florer
Grant Snyder	K.C. Singh	Mio Kitano	Tom Rogers
Heath Hoffman	Kathy Lee	Mustafa Saribudak	Tony Blair
Jason Greenwood	Kenadi Sutton	Pat Frost	Yongli Gao

Volunteers

Co-Chair	Geary Schindel	Safety	John Young
Co-Chair	Mike Harris	Volunteer Coordinator.....	Kori Dunaway
Treasurer	Sue Schindel	Food and Promos Coord	Sue Schindel
Secretary.....	Tom Florer	Web Registration	Jesse Chadwick
Logistics & Sanitation.....	Mike Harris	Web Developer.....	Jill Orr
Campground Marshall.....	Mike Harris, Tom Florer, Geary Schindel	Program & Graphic Design.....	Jill Orr
		T-shirt Design.....	Don Arburn

David DeLuna	Leia Hill	Rachel Lindsey
Fran Hutchens	Michael Cunningham	Ross Webb
Garry White	Michael Harris	Ross Webb Jr
Geary Schindel	Michael Polendo	Roger Andrade
Jesse Chadwick	Micheal Tudor	Steven Gutierrez
Joann DeLuna	Mike Burrell	Susan Schindel
Kathy Lin	Mio Kitano	Tom Florer
Kori Dunaway	Nate Clark	Tom Rogers

Workshop Module Locations



Off-site modules meet at the Pavilion.

Kreutzberg Canyon Natural Area

143 Mark Twain Road, Boerne, TX 78006

Head west onto Cave Without A Name Rd. *0.4 miles*

Slight left onto Kreutzberg Rd *0.7 miles*

Turn right onto Mark Twain Dr.

Turn right into Kreutzberg Canyon Natural Area.

Follow this road north *1 mile* to the river-side parking area.





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