TCMA PASSAGES

SPRING 2002

Cavers, Landowners, Government & Endangered Species - Collision Course or Cooperation?

by Linda Palit

Misconceptions seem to abound among Texas cavers and Texas landowners about the Endangered Species Act, endangered species in caves, and what the government can do concerning private land. This article provides accurate information that cavers should know and pass on to cave owners.

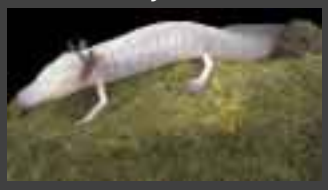
No endangered invertebrate species exist in caves in rural counties of Texas. It is unlikely that they ever will and certainly not anytime in the foreseeable future. Listing is done based on threat to a species' survival. The discovery of new species does not mean they will be listed. Most species that occur in rural Texas counties are widespread in Texas, so while even if threats to their survival may occur at some caves, the population as a whole remains intact and there is no need for listing.

In the urban counties the situation is different. Some species are known only from a few caves (and are restricted to those caves by geologic factors that keep them from occurring in other areas) and the areas in which those caves occur are being heavily impacted by urban development. That is why those species have been listed. Federally listed endangered cave species exist only in the following urban Texas counties: Bexar, Travis, and Williamson. To get the Bexar County species listed took eight years. It is very unlikely that any more species will be listed soon, maybe ever.

See ENDANGERED on p. 3

Selected Endangered Species of the Edwards Aquifer

Photo by Joe N. Fries



- Texas Blind Salamander *(Photo at right)* - Hays Co.
- Fountain Darter - Hays & Comal Co.
- San Marcos Gambusia - Hays Co.
- Comal Springs Riffle Beetle - Comal Co.
- Comal Springs Dryopid Beetle - Comal Co.
- Peck's Cave Amphipod - Comal Co.
- Helotes Mold Beetle - Bexar Co.
- Madla's Cave Spider - Bexar Co.
- Robber Baron Cave Harvestman - Bexar Co.
- Robber Baron Cave Spider - Bexar Co.

Inside the Passages

Robber Baron Update	4
TCMA Sponsors Gated Cave Tour	5
Cave Management Symposium Report	8
TCMA Acquires Karst Groundwater Model	11

View from the Palit

by Linda Palit

TCMA — Cave management – What's that mean? With the discovery of endangered species in urban caves in Travis, Williamson, and Bexar counties that means preserving the habitat for the critters, and sometimes cave owners finding and funding TCMA to "manage" the habitat around the cave by killing fire ants, checking fences, and oiling cave gates. It's good work to do, and needs to be done.

Is that all conservation and management is about in Texas? What about all the caves in all the rural areas that are becoming less and less accessible to Texas cavers? When was the last time you visited Fern Cave or Langtry Lead Cave or any other of the Texas classic caves? And why don't Texas cavers own or manage more of these caves? Do we not want to?

When I started working with cave conservation I envisioned making more caves permanently available to Texas cavers, and managing them in a way that keeps them beautiful and available for generations of Texas cavers. That isn't happening nearly enough. Is it possible?

One way to keep the caves protected and accessible is through conservation easements with landowners. If a landowner wants to preserve his cave, he can make an agreement with TCMA called a conservation easement. This defines a certain area of land is not to be developed ever, except in the specific ways defined in the agreement such as maybe providing for a house or use of the land for livestock. The landowner receives a reduction in taxes to compensate for the loss of the developable value of the land. TCMA contracts to ensure the agreement is honored, and manages the cave and surrounding land. This agreement survives even if the land is sold, or the owner must pay back the tax savings.

One of the best ways to protect caves is through conservation easements with landowners. This allows the cave to be professionally managed, helps limit liability, and provides controlled and continued access to cavers. Conservation easements are an enforceable contract between the owner and other interested party such as the Nature Conservancy or the TCMA. The easement defines the responsibility of each of the parties and usually limits development of the property in exchange for a reduction in taxes. The agreement is recorded on the property deed and survives the future sale of the property

Cavers can also purchase caves. As a group, the TCMA also has the purchasing power to acquire some of the best Texas caves and maintain there access to cavers. Over the next year, the TCMA will, with the support of cavers, purchase two Texas caves with the expressed intent of opening them up to caving. The size and importance of these caves depends on the participation and enthusiasm of Texas cavers. This will be used as a basis for further purchases to help assure continued access to caves by cavers for generations to come. The TCMA has recently set up a land acquisition committee and is actively seeking caves to purchase. However, we need your support. This includes financial as well as labor to identify and manage perspective caves.

Permanent access to all Texas caves is not possible. Can we work together, and save some? I think Texas Cavers can.

TCMA PASSAGES Spring 2002

Vol. 3 No. 1

The bi-annual publication of:
The Texas Cave Management Association
PO Box 202853
Austin, Texas, 78270-2853

Editor:
Joe Mitchell
11463 Enchanted Sunset Dr.
San Antonio, TX 78253
e-mail:<joemitchell@satx.rr.com>

ENDANGERED *(from p. 1)*

There is no agency, federal or state, that can take some family's land or tell him them to manage their cave whether it has cave critters or not. The right of eminent domain exists in which the government can force you to sell your land because of building a road or installing a power line. That has nothing to do with caves.

The federal agency in charge of overseeing endangered species is the U.S. Fish and Wildlife Service. Their main charge is to protect the species, and to develop a plan that will lead to the recovery of the species so that they can be delisted or at least protect them from extinction if delisting is impossible. To do this usually involves protecting habitat. For cave species this means not filling caves with concrete or covering them with roads or buildings, and protecting the area around caves so that fire ants, fertilizers, polluted water, too much silt, or changes in the internal environment of the cave do not harm the species in the cave. Urban county cave owners may be asked to protect their cave habitat in these ways.

If a cave in an urban area is on land that an owner wants to develop, it becomes more complicated for the owner and the developer. If a cave with endangered species is in the development area or close to the development area so that endangered cave species are likely to be harmed or lost, whoever is developing the land must file a plan with U.S. Fish and Wildlife which usually provides for saving 2-4 other caves forever (in perpetuity) and saving enough habitat around the cave to ensure that the cave environment is protected. The amount of land that which must be protected is typically 69-99 acres, although in some special cases much smaller areas may be accepted by the U.S. Fish and Wildlife Service. This process is called mitigation. The caves preserved are mitigated for the caves destroyed or impacted. The species in the mitigated caves must be the same as the species in the caves that are lost or harmed.

Finding caves to mitigate for the cave being destroyed is the first problem for the developer. The developer must locate caves with the same species and buy them before development can begin. Then a plan must be filed and approved by U.S. Fish and Wildlife. The problem is to locate the cave. The developer may make random calls looking for a cave in the area, talking to landowners explaining the perils of owning an "endangered species" cave and offering to purchase the cave and surrounding property if they have one. If the landowners do not have a cave, perhaps they know somebody who does? The developer tells the landowners that their caves are liabilities. That is true if the landowners want to develop their land but less true if they do not. However, some landowners have determined that their caves are worth more money than land without caves. They sell their caves for mitigation to developers and are asking higher and higher prices. Other cave owners in the urban counties are frightened about the liability of their cave with it possibly containing endangered species. Some are anxious to sell the cave. Others refuse cavers access to their caves. A few have welcomed cavers to look for caves with endangered species so the caves can be sold for mitigation at top dollar rates.

Texas cavers need to have accurate information about this process. Developers look out for their own interests and use the Endangered Species Act to promote their self-interest. This may or may not be in the interest of owners or cavers. Information is power; let's not let it be used against us.

TCMA Board of Directors/Officers 2002

Linda Palit <lkpalit@swbell.net>	**President**
Julie Jenkins <jjules@ccms.net>	**Vice President**
Sue Schindel	**Treasurer**
Susan Souby	**Secretary**
Aimee Beveridge	**Board**
R.E. Burnett	**Board**
Walter Feaster	**Board**
Jay Jorden	**Board**
Joe Mitchell	**Board/Passages**
Bill Russell	**Board**

Robber Baron Cave: Status Report on Gate Repairs

by George Veni

In the fall of 2001, TCMA received a grant from the U.S. Fish and Wildlife Service to improve the gate on Robber Baron Cave and modify the grounds for better management of the federally listed endangered species that live in the cave. During inspection of the gate to begin the modifications, it was discovered that the massive structure is on the verge of collapse. Access to the cave was immediately closed. Bexar Grotto's Robber Baron Committee formed a Cave Gate Subcommittee to rebuild the gate and reestablish access to the cave. The Subcommittee is comprised of Rick Corbell, Bob Cowell, Steve Gutting, Kurt Menking, Alan Montemayor, Linda Palit, Carl Ponebshek, Chris Vail, and George Veni.

The subcommittee is planning to remove "The Bunker," the large gate structure, from the cave's entrance in order to remove the rotting underlying railroad ties. The current plan is to replace the ties with vertical manhole standpipe. The bunker will be installed on top of the standpipe with some modifications to improve ecological and air quality in the cave. No date has been set thus far for the repairs. The committee is now seeking donations of materials and equipment. Once these are lined up, cavers will be notified and invited to help with the work. In the meantime, if anyone has contacts for donations of manhole standpipes, cranes, dumpsters, or other heavy equipment, please contact me at gveni@satx.rr.com or call 210-558-4403.

The subcommittee has been looking into sources for these materials but there is no guarantee our sources will produce anything so alternative suggestions are welcome. Repairs on the gate were stalled when it seemed a construction company would provide all of the support, but then had to withdraw for reasons unrelated to TCMA. The subcommittee is now moving at full steam to finish this work as soon as possible. All contributions to TCMA are tax-deductible and TCMA can provide you with its tax numbers upon request. Announcements will be made to call for help when the repair work will be performed.

A Brief History of Robber Barons Cave

Robber Baron Cave is the longest cave in Bexar County. It is also the only cave in the county that has been open to the public as a tourist attraction. From 1926-1933, an estimated 300,000 people toured the cave, which was then located outside the city of San Antonio on the Old Kings Highway to Austin in what is now Alamo Heights. Since closing due to the Great Depression, the cave served to commercially grow mushrooms but mainly fell into disrepair. As the city grew around the cave, it became a local playground for children who risked injury to themselves while vandalizing the cave.

In 1980, members of the San Antonio Grotto gated the cave for the owner to limit his liability and stem the tide of damage. They explored and mapped the cave and documented its rich history. Geological and biological studies were also done in the cave, discovering six blind invertebrate species found nowhere else on Earth. In December 2001, two of these species were listed as endangered by the U.S. Fish and Wildlife Service.

When the cave's owner died in 1994, his bequest had the cave donated to the Bexar Grotto, whose members arranged for the TCMA to own it with Bexar Grotto as the cave's manager. The grotto has led many educational trips into the cave and conducted many clean-up projects both below and above ground to be good neighbors to the surrounding homeowners.

The Robber Baron entrance before the installation of the current gate. Photo by David Nash
Photo from the Caves of Bexar County Second Edition by George Veni. Used with permission.

TCMA TRIP REPORTS

TCMA Sponsors Successful Gated Cave Field Trip

by Ron Ralph

Last March, Bat Conservation International hosted a symposium for cave managers in Austin Some 120 participants from all levels of state and federal bureaucracies, private managers and local people attended the three day meetings. The symposium gave participants a chance to present and assimilate material concerning bats, caves, and bat conservation. The Texas Cave Management Association was asked to sponsor and conduct a tour of gated caves in the Austin. This was a Thursday continuation of the symposium scheduled for March 7, 2002. It began and ended at the Red Lion Inn, symposium headquarters.

A 55-passengere bus rolled into the parking lot at 9:00 am and once loaded, began the first run to south Austin. Goat Cave Karst Preserve was the first stop and Mark Sanders, biologist for Austin Parks and Recreation, presented the new fence around Goat Cave and discussed the economics and aesthetics of the project. The next two stops were the Western Oaks Karst Preserve and Midnight Cave. If you haven't seen Western Oaks, you are missing a great little park with a gravel trail and several caves. Interpretive signage is scheduled soon. The tour continued past District Park Cave and Whirlpool bypassing Cotterell Cave in the Spicewood Springs Preserve due to lack of time. These caves are well worth the time it takes to stroll down the path.

A fabulous sit-down lunch of Southwestern chicken was catered by Tastebuds. The flowing waters against the backdrop of limestone cliffs at Bull Creek provided a soothing view of pristine Austin. All too soon, the bus was loaded and the tour continued.

At the corner of Highways 2222 and 620, Mike Warton pointed out the trail to Tooth Cave. This small grotto contains more endangered species than any other in the Austin area and was the impetus for many environmental laws pertaining to caves and endangered species. The tour continued past Lakeline Cave at the mall and stopped at the Buttercreek Karst Preserve for a look at Animal Canyon and Cedar Elm Cave. Fern Bluff Cave, with a classic "A-frame" design gate, sits alone in the middle of a brush-cleared Municipal Park. Last on the list was Beck Ranch cave where obliging locals equipped with flashlights and low batteries turned out to show participants there really were vandals in the suburbs. The tour returned to the symposium hotel at 5:00 p.m. in time for happy hour.

Rune Burnett visited all gated caves to figure mileage and drive times and to photograph the entrances. Rune also helped assemble the guidebook and figure the route. William Russell put together data for the guidebook and helped with final editing. Jim Kennedy was invaluable answering questions about the symposium and visited several of the cave localities to help in the decision making process. Mike Walsh, with Texas Cave Conservancy, showed many of the newly gated caves under TCC management and helped out with the tour by answering questions on site. Mike Warton, an involved cave gate builder and as a presenter at the symposium was on the bus with a rolling dialogue on each cave gate. Logan McNatt and Michael Moore assisted with logistics and Don Broussard assisted with the luncheon arrangements.

A second printing of the guidebook is in press and will be available at the next Texas Speleological Association meeting. It contains a great road log to many nice Austin area caves and presents historical footnotes never before published.

TCMA TRIP REPORTS

Bracken & Reeh Ranch

by Linda Palit

TCMA hosted a Karst Project at the Bracken& Reeh Ranch Property north of the Cibolo Creek in far northeast Bexar County on February 1 and 2. Volunteers attended Saturday and/or Sunday to search for caves, karst features, and any other significant land feature worthy of note. A total of 25 volunteers worked for approximately 175 hours searching the 400 + acre portion of the property.

Near the Cibolo Creek the Kainer formation of the Glenrose Limestone is predominant. This is not ideal for extensive cave formation. Further north is the Basal Nodular Member of the Edwards Limestone. This is an exceptionally hard layer of the Edwards, where voids existing underground often do not have passages to the surface. Limited recharge probably takes place on the property, but the presence of creek beds indicates some water runs off to Cibolo Creek. The main creek is intermittent, with some recharge probably occurring in some areas of the creek bed. Overall, the land has the appearance of karst meaning there are many areas of limestone pavement, areas of limestone rock with significant weathering and holes, and areas of very little topsoil. This indicates that rainwater infiltrates into the ground recharging the aquifer.

Significant cave features were sparse. Two small caves were exposed with minor movement of rocks. One cave was approximately 15 m in length and was located at approximately 1107 feet elevation on the central northwest flat area of the cave. It was a relatively uniform feature of crawl space and may have been a paleospring. A second cave was found at the front portion of the property on the southeast portion of the property at approximately 1050 elevation. It was a low small room of approximately 10 m long with a dirt choke at the end and a well-formed stalactite. This cave might be excavated and expose more passage.

Features included limestone crack with moist air flowing out and a frog and cave cricket. It was located at the coordinates 0560333 and 3287252 on the ranch road area not too far from the pipeline. A second feature was located at 0560602 and 3287409; it was about 2 m off the ranch road running east of the pipeline; ended at a formation choke of flowstone and a stalactite.

PHOTO BY ALLEN COBB

ABOVE: *The TCMA Board met along the Cibolo Creek (seen in the background) at the Reeh Ranch.*

PHOTO BY KATHY SCANLON

RIGHT: *Kate proudly shows off the results of her digging at Froggies Fissure.*

TCMA TRIP REPORTS

Significant recharge features in the sense of clear depressions or sinkholes which might lead to underground caverns were also sparse. Additional interesting features were noted on the property. Along one streambed on the property, palmettos were growing. This is very unusual for this part of Texas, and especially for the karsty hill country area.

A cemetery is marked on the topographical map. At that site there were no exceptionally clear indications of actual graves, though one slightly sunken depression was noted. There were four fence posts rotted off to about ground level in the middle of the area, which might have been a clearing. There were also four to six exceptionally large live oak trees in the area. Other areas had additional live oak groves with trees of significant size. Cedar (juniper) trees of significant size were also noted, and my provide bird habitat of an important nature for warbler habitat.

Additional searches of this area are unlikely to expose extensive karst areas not already discovered. Recharge does occur, but not to the extent or magnitude of that in the central Bexar County Edwards Limestone areas. The land is extremely attractive, however. The lands on the Reeh/Bracken Property that are south of the Cibolo are more likely to have significant karst features, recharge features, and cavern development.

PHOTO BY KATHY SCANLON

ABOVE: *Cindy's Crack was another karst feature dig at the TCMA Reeh Ranch trip.*

Mayberry Tract

by Joe Mitchell

The Mayberry Tract is a 345 acre parcel of land located in northwestern Bexar County along Hwy. 211 across from Government Canyon SNA. This tract is currently for sale and is being considered for purchase by the City of San Antonio as part of the program to acquire and protect land over the recharge zone of the Edwards Aquifer.

On March 3, the Texas Nature Conservancy asked the TCMA to evaluate the land for its cave potential. Nine volunteers attended the event and spent most of the day combing the property in search of caves and karst features.

The property borders San Geronomo Creek which is cuts a deeply incised valley. The bulk of the property is highlands rising a couple hundred feet above the creek. The highland section is relatively flat except that it id bisected by a dry creek which cuts substantial cliffs in some areas.

The first area to be searched was at the base of the valley along San Geronomo. A small cave was found that contained numerous formations in a small room. After no other features were found in the valley, the group moved up onto the ridge top and split up into groups the search down toward the dry creek with the cliffs. Along the way the remnants of long since eroded cave formations were seen. The dry creek area was quite scenic with numerous exposed outcrops of limestone seen along with various solutional features. Although a good deal of time was spent searching this area, no cave entrances were found. Late in the day while looking on the opposite hill side of the dry creek, a potential opening was found under a rock that had harvestmen living in it. The group dug on this for a while, but determined that it probably would not lead to anything.

This is a very nice tract of land and at first glance it appears that caves should be numerous. Although not all of the property was searched, the lack of features was discouraging. At least one further trip should be conducted though to examine those areas missed in the first trip.

Conference Report: 2001 National Cave and Karst Management Symposium

by George Veni

(Reprinted from Geo2, 2002, vol. 29, no. 1)

I don't recall previous reports in Geo² on the National Cave and Karst Management Symposium (NCKMS). While it is not strictly a geoscience meeting, every two years this conference convenes and includes important geoscience papers. Unlike the Geology and Geography Session at NSS Convention where geology papers dominate, geography papers with a strong management emphasis dominate the NCKMS. This year the NCKMS was held in Tucson, Arizona, hosted by Jerry Trout and the National Forest Service with the help of Tucson's Escabrosa Grotto.

Pre-symposium caving

I arrived a few days early to catch some caving trips. I thought several cavers would be present for the weekend trips, but only found Cheryl Jones from Virginia, waiting with me for the Tucson cavers on Saturday morning, 13 October 2001. Dave and Phyllis Hamer coordinated the pre- and post-symposium caving trips and were assisted throughout the week by several Escabrosa Grotto members.

We drove about an hour southeast of Tucson into one of the "sky islands," lush mountains that rise out of the desert "sea," of the Coronado National Forest. Our destination was Cave of the Bells. We drove to within a 2-minute walk of the double-gated cave and headed in. The cave somewhat reminded me of Colossal Cavern, a show cave near Interstate Highway 10 about 40 km to the north. Bells is often dry with tall, narrow passages, and better decorated than Colossal. Its passages are generally oriented along strike and faults with 1-m-wide shatter zones. The cave is a phreatically formed 3-dimensional maze with about 4 km of surveyed passages. It extends down over 70 m to near the water table, but we stayed in the upper levels and explored a loop that included a couple of nice sized rooms. The cave has been known for many years and has seen considerable damage to its speleothems. It's named for some stalactites that long ago were discovered to ring like bells when struck. Aragonite is abundant and often well developed in many of the areas we visited.

The Tucson cavers have the admirable ethic to wear only clean clothes caving to keep the caves as pristine as possible. After we left Bells, Cheryl and I were up late buying laundry soap and getting our gear clean for the next day's trip into Onyx Cave. We were a little disappointed to find that we were nearly as dirty as when we exited Bells by the time we got to the decorated areas of Onyx. Looking back, this isn't too surprising. The cave is beautiful, but like nearby Cave of the Bells, it has a long history, and some parts are muddy from trampling. A 63-year-old woman who had explored and photographed Onyx Cave in 1958 accompanied us on our trip. She accidentally met the Hamers while she was in town briefly, and they got her geared up to revisit the cave with her daughter.

Onyx Cave has about 3.3 km of surveyed passages with a few leads still to wrap up. Like Bells, it extends to near the water table, but since it is located higher up the mountainside, it has a greater vertical extent of about 90 m. We again stayed in the upper levels which have a relatively flat ceiling, but a lot of free-climbing is needed as the floor steeply rises and falls. Unlike Bells, the passages in Onyx are larger, often wider than high. There is at least one large room that we didn't see. Flowstone and dripstone fill much of the cave and a lot of its ups and down are over large deposits. Shields and helictites are abundant. Some pools contain mammalary spar deposits and thick shelfstone. Near the end of our trip, Dave and other local cavers retreated to help the non-cavers out to the entrance past some tricky climbs. Phyllis led me, Cheryl, and Pat Seiser from West Virginia on a nice loop trip before we exited a short time after the others.

Monday was officially a pre-symposium day, although many people had arrived. Carol Zokaites offered a Project Underground workshop to train people in educational methods for teaching children about caves and karst. She has run Project Underground for several years and has developed a sizeable network of instructors throughout the country who routinely teach kid-level versions of karst hydrology, biology, and management.

I went to Kartchner Caverns State Park, located about 65 km southeast of Tucson. The cave is the newest jewel in the Arizona State Park system and has been highly publicized. I had been to the cave before but went to visit with geologist Dr. Rick Toomey, who had recently been hired to work as

the cave specialist. While there, Rick invited me to stay and see a demo of the Cyrax, a laser surveying machine. It shoots 1,000 laser points per second, calculating direction and distance, and then plots those points in space to create a 3-dimension map. We hauled the two big Cyrax equipment boxes and several smaller bags of gear into the cave and began surveying the walls. A 5-minute scan surveyed a 10-m-long by 6-m-high section of wall at a resolution of 1 cm, (maximum resolution is 2 mm with a rated accuracy of within 6 mm, and the laser can read distances to about 200 m) and after about 2 minutes of data processing, we were looking at the wall in 3-D on the laptop. Very impressive. As soon as they come up with a hand-held version and drop the price from nearly $240,000 with all of the accoutrements, traditional cave surveying will become obsolete. Personnel from Geo-Map of Tucson were demonstrating the machine. They explained how it has been used in mineral and metal mining, how algorithms have been written to identify fracture planes from the data and plot them on stereo nets, and how signal reflectivity can be used to identify surfaces with greater and lesser moisture. The Cyrax and its descendents in the future have tremendous potential to tell us much more about a cave's hydrogeology than is now possible through standard cave maps.

I returned to Tucson that evening to a possibly new tradition for the NCKMS. A "crackerbarrel" session was held, an open forum discussion on a topic of interest. The forum was loosely moderated and a variety of topics were offered. The potential application of OSHA regulations on cave work was discussed. The general consensus was that it was a bad idea but that OSHA regulations may be coming for some regions and fields of work.

Symposium

"There's no good time for bad news," Jerry Trout told us after the introductory remarks to kick off the symposium, and then relayed the terrible news that longtime NSS member, Geo^2 Section member, NCKMS attendee, and cave management luminary Dr. George N. Huppert was killed in a car accident while driving to the symposium. The announcement had to be made, but of course it cast a pall over the event, with fresh news about the accident and services arriving throughout the week and keeping the wound raw.

Harvey DuChene did a fine job to restore the spirits of the symposium with his keynote address. He raised an important theme that was highlighted by speakers in many of the papers that followed: the importance of volunteers in much cave management and science work. Harvey was followed that day by 15 papers focused on management issues. Among papers of interest to Geo^2 readers, Zelda Bailey gave an update on the status of the National Cave and Karst Research Institute, most of which was covered in her report in a recent issue of Geo^2. Tim Stokes and Paul Griffiths outlined a procedure they developed to conduct vulnerability assessments of karst areas for forestry management in British Columbia using hydrogeologic and geomorphological data. Susan White focused on karst development and management in Pleistocene aeolianites in Australia. Henry Schneiker presented the specifications for an in-cave weather station he is building. It promises to be resistant to the high humidities found in caves, and have long battery life, abundant data storage, and fine resolution measurement of cave climates that is beyond the ability of most available instrumentation.

Wednesday proved a short day for papers. They were given in the morning and followed by an afternoon fieldtrip. Management-oriented papers continued, followed by several geology papers. Rod Horrocks used hydrogeologic factors to delineate the probable maximum extent of Wind Cave, South Dakota, as a means of identifying critical management areas that do not rely on cavers having to find and map passages before those areas receive consideration for protection. Some debate ensued on how effective some factors may be in limiting cave development, but the GIS method he presented shows high potential for application in many settings. Other morning papers included a morphologic and hydrologic sinkhole classification system for land use planning by Wil Orndorff and Joey Fagan and discussion of seismic damage in caves by Roberta Surface and Eric Gilli.

After the morning sessions, everyone headed onto buses for an afternoon trip to Kartchner Caverns. We divided into four groups and shuttled between four areas, two in the cave and two outside. My group first visited the 1.3-million dollar Discovery Center, an incredible facility built to have little impact on the cave and surrounding terrain while providing outstanding museum-quality displays and hand-on/crawl-through activities about Kartchner, caves, and karst. We then crowded into the center's meeting room for a demonstration of the Cyrax laser surveyor. With that complete, we moved into the cave to view the developed areas and then the areas still under development. Most people I spoke with agreed that Kartchner is not the

most magnificent cave in the world, as the press would have you believe, although it is a wonderful cave. What stood out about Kartchner for the cave management audience is the new standard it sets for show cave development and management: high curbs to control visitors and prevent lint dispersion, a sewer system for the removal of effluent following daily washing of the trail, a detailed micro-climate monitoring system, a sophisticated utilities system to conserve energy usage and input into the cave, extensive use of plastic sheeting and other techniques to cover and protect areas of the cave near trail construction zones, among several other factors.

Thursday's papers continued with management themes but also included ten papers on cave biology and seven on GIS and mapping in karst. I gave a paper on the use of GIS in the San Antonio, Texas, area to identify hydrologically and biological important areas of the Edwards Aquifer recharge zone for purchase and protection. My favorite paper that day was by Jim Baichtal and Richard Langendoen on the use of LIDAR (LIght Detection And Ranging), a form of aerial laser topographic mapping, to study and manage karst on Kosciusko Island in the Tongass National Forest in southeastern Alaska. This high-resolution mapping is important not only for guiding forestry practices, but it has tremendous application in morphological and hydrological analysis of the karst. Jim gave one humorous anecdote on the importance of working closely with non-karst specialists who processed data. The firm he contracted to do the survey initially threw out many data points as obviously "bad data," since single laser points shouldn't be 100 m lower in elevation than others surrounding them only a few meters away. Jim explained that those "anomalies" were in fact the deep shafts he was looking for!

The papers ended in the early afternoon so everyone could enjoy some time at the Desert Museum on the outskirts of Tucson. Most of the museum is outdoors rather than indoors, and includes an outstanding set of trails through displays of desert plants and animals. The prairie dogs were certainly the most entertaining. The museum is also known for its extensive and realistic artificial cave, complete with stoopways, water, and pits, but no mud. Once the museum closed to the public, a cocktail social and catered banquet were prepared for symposium participants. Gary Tenens and Randy Tufts, the cavers who discovered Kartchner Caverns, gave the banquet address on their discovery and extensive efforts at secrecy until the cave could be protected. They were followed by a brief memorial for George Huppert and an announcement that a cave conservation fund in his name is being established with the American Cave Conservation Association. Jerry Trout closed the evening with acknowledgements for the many people who helped put this fine symposium together.

Jerry's closing statements were given because Friday's papers would be over before noon and many of the over 150 participants would be returning home before the day was done. Those papers included discussion of toxic materials in the karst environment, such as Michael Anderson's and Joe Meiman's papers on how atrizine can be transported more effectively via suspended sediments than by water through Mammoth Cave, Kentucky, and two more papers on geology: "concealed" or "apokrytic" karst in southern Arizona by William Peachey and karst in arid sections of Australia by Nick White.

Post-symposium events

As the symposium wrapped-up on Friday morning, the Tucson paper greeted us with news that the Arizona State Parks Board met the previous day about a proposed resort near Kartchner Cavern that threatened to impact the cave. The Board decided to offer the developers a fair price for the property, and if it was not accepted, they would condemn the land and pay whatever a judge would feel that the condemned land is worth. This is an extreme and difficult measure to protect and manage karst, but one that is not used nearly enough. I applaud the Board for showing the conviction and political courage to take such action when it is justified.

I needed to return to Texas, but those staying for the post-symposium events found a variety to choose from. Jim Kennedy of Bat Conservation International offered two workshops on bat conservation, the Hamers offered more caving trips, and for those more politically inclined, the NSS Board of Governors and the Cave Research Foundation's board met that weekend in the area.

The 2001 Tucson meeting proved to be another success in the series of the NCKMS. Proceedings are promised soon, but their slow publication remains the main problem of the symposia. I hope this meeting breaks that trend. The next NCKMS will be held in Fall 2003 in Gainesville, Florida, chaired by Steve Omeroid and hosted by the NSS Cave Diving Section.

TCMA Awarded NSS Conservation Grant-Karst Groundwater Model

by Aimee Beveridge

The TCMA has recently acquired a Karst Groundwater Model for our educational outreach programs. Largely a result of encouragement from Val Hildreth and Jim Werker, Co-Chairs of the NSS Conservation Committee, the TCMA applied to the NSS for a grant to pay for the purchase and delivery of the Karst Groundwater Model. The Model is available to any TCMA member wishing to use it for demonstration purposes.

The model consists of two clear plexiglass sheets containing layered sand and plastic which simulate clastic and karst aquifers. Injection wells, a sink hole and other point sources are included and can be used to pump or inject contaminants (colored water) into various parts of the model. Water can also be introduced by pouring water into reservoirs at either end. The kit includes a carrying case, quart sized flask, hand operated vacuum pump, various syringes for injecting "pollutants" and an instruction manual.

The model demonstrates many groundwater concepts including:

- How groundwater moves
- Flow rate of groundwater is dependent on the type of aquifer (eg: karst, gravel, fine sand)
- Human activity at or near land surface can contaminate groundwater

If you are interested in borrowing the model please contact Aimee Beveridge at aimeebev@hotmail.com or call her at 512-463-7995 during the day or 512-444-4881 in the evenings.

PHOTO BY ALLEN COBB

The TCMA Board at work: *From the meeting of Feb 3, 2002 at the Reeh Ranch. The new Karst Groundwater Model can be seen on the table near the center.*

MINUTES
ANNUAL MEETING
TEXAS CAVE MANAGEMENT ASSOCIATION
Meeting Date: October 20, 2001
Location: Horseshoe Bend, San Marcos River

Directors/Officers Attending	Absent:
Jay Jorden, Director (Jan 2000-Dec 2001)	Dan Hogenauer, Director (Jan 2000-Dec 2001)
Bill Russell, Director (Jan 2000-Dec 2001)	**Noted Attendees:**
Linda Palit, Pres. & Director (Jan 2000-Dec 2002)	Ron Ralph, Past Director
Julie Jenkins, VP & Director (Jan 2000-Dec 2002)	Carl Ponebshek, Past Director
Bob Burnett, Director (Jan 2000-Dec 2002)	Susan Souby, Secretary
Sue Schindel, Treas & Direc (Jan 2001-Dec 2003)	
Aimee Beveridge, Director (Jan 2001-2003	
Walter Feaster, Director (Jan 2001-2003	

Opening

The meeting was called to order by president Linda Palit.

I. Approval of Minutes

The Minutes of the September 30, 2001 Board of Directors meeting were approved with corrections by Geary Schindel. The corrections: The name Edward's Aquifer Underground Water District should in all cases be changed to Edward's Aquifer Authority.

II. Treasurer's Report

Treasurer Sue Schindel reported that TCMA currently has a balance of $11,868.08. TCMA owes Peter Sprouse about $3000.00 for work at Camp Bullis. TCMA has not received current payments from the Army for the contract on Camp Bullis.
Sue will research moving the checking account to a bank which does not charge a service charge and which pays interest. Several attendees related experiences setting up checking accounts for non-profits and opening a savings account with a limited number of checks per month.

III. Membership Committee Report

Susan reported that the letters to the life members requesting a sustaining contribution had resulted in 11 replies and $260.00. The renewal letters to the regular members were mailed Tuesday, October 8. Of the 33 mailed, 5 were returned undeliverable and 1 renewal for a family membership was received. Julie counted 5 more membership renewals so far during TCR.
Julie reported that new brochures, stickers, and T-shirts are available at TCR. Stickers are free to new and renewing members and t-shirts are $10.00.

IV. Aimee - Karst Model

Aimee reported on the grant she received from the NSS for a karst model. The model will be sent to Aimee's house this fall. Aimee will take digital pictures of the model when it arrives and send them to the Board members. Aimee will also write an article for *Passages* explaining the model. Aimee is looking for anyone with contacts with schools, or other venues for outreach programs to use the model as an educational tool.

V. Walter - UT Lands Update

Walter reported on the renewal of the agreement with the University of Texas for management of O9 Well and Amazing Maze cave. He currently has a draft agreement, which is being reviewed by the TCMA Board. Walter said that both of these caves are closed until the management agreement is renewed. Walter said TCMA's relationship with UT is good, and UT does not want to keep the caves closed. He has not talked to UT about replacing the gate at Amazing Maze but assumes the previous conversations stand: UT will provide materials and TCMA will provide labor. Bruce Anderson brought up concerns about the insurance requirements and the timing of the renewal as stipulated in the agreement. Linda assured Bruce that the agreement will be reviewed carefully, especially these portions. Linda and Jay will continue conversations about the renewal after the annual meeting, and will seek legal review also.

VI. Cave Gate Trip Report

Ron reported on the planning of the cave gate field trip that he and Rune are leading. The planning process is on track. The field trip will be in conjunction with the BCI symposium to be held in Austin the 1st week of March 2002. The symposium is scheduled for Tuesday, Wednesday, and Thursday, and the field trip is Friday, March 8, 2002. Ron has a proposed itinerary that he invited TCMA members to review. The itinerary includes caves in the Austin area with various types of gates. Rune and Ron don't know the number of participants yet but are planning for a maximum of just over 100. Ron asked for VOLUNTEERS to sign up. They will need as many as 14 people. These include volunteers to help coordinate the participants, to speak at the stops about the gates, to provide a catered lunch, and to drive if vans are used for transportation. City of Austin employees may be some of the volunteers to give presentations at the caves.

VII. Possible trips to Bear Bluff Ranch, Mayberry tract that is just upstream of Bear Bluff and part of the Reeh/BCI tract

Linda noted several properties that are possible trips for cave surveys. These include the Mayberry tract of the Bear Bluff Ranch and part of the Reeh/BCI tract. Linda suggested November for the Mayberry tract and after the 1st of the year for the Reeh tract.

VIII. Board terms expiring: William Russell, Dan Hogenauer, Jay Jorden — Open nominations: Jay Jorden, William Russell, Joe Mitchell

There are 3 terms of the Board of Directors of TCMA expiring in December 2001. They are Jay Jorden, Bill Russell, and Dan Hogenauer. Dan declined nomination for another term. The nominees for the 3 positions are Jay Jorden, Bill Russell, and Joe Mitchell. All three nominees were elected by acclimation. The three terms will run from January 2002 through December 2004.

IX. Other Business, new or old

TCMA Booth at TCR

The TCMA booth at TCR was the result of the good work of several people. Special thanks to Geary Schindel for purchasing a shelter and for volunteering to sew bags for the poles. Many special thanks to Julie Jenkins for the great display panels with photos of the TCMA managed caves as well as the T-shirts, stickers, newly printed membership forms, several TCMA signs and banners, and various items from BCI for sale. Special thanks to Carol Henderson as an experienced volunteer marketer for setting up the cash box and getting us organized. Also special thanks are extended to those who represented TCMA at the shelter, especially Julie, Carol, and Sue Schindel.

The 50/50 pot fundraiser was held again this year. In addition to the cash drawing, there were 2 other drawings for caving gear.

Robber Baron Cave Update

George Veni reported on the status of Robber Baron after the September 30th meeting of the Robber Baron Cave Gate Committee. The cave is currently closed due to the instability of the entrance. The railroad ties which support the concrete entrance bunker are unstable and on the verge of collapsing. The plan now is to pull out the bunker with a crane, install a 6' diameter culvert, and then replace the bunker on top of the culvert. A concrete junction box between the culvert and the bunker will complete the entrance. George said the gate replacement is scheduled for the end of the year. He will need people to camp on the site while the work is going on because it will take from several days to a week to complete. The committee is seeking sources for a crane and for donation of a culvert. The transport of the culvert may require a cash outlay. The grant received from the U.S. Fish & Wildlife will reimburse for material costs. Cavers will contribute labor. Attendees discussed sources for donations. Ron Ralph suggested the County Commissioner Precinct office as a source. The City of San Antonio block grant money for neighborhoods was also mentioned. George also summarized the 'Partners for Fish & Wildlife Program' project phases. In addition to stabilizing the entrance, 1' diameter culverts will be installed to increase air flow and debris entrance. The area around the entrance will be landscaped with native plants to provide foraging vegetation for cave species. (See article in the fall 2001 issue of TCMA *Passages* for further information on 'Partners Program'.)

Carl Ponebshek reported on his contact with the City of San Antonio and the city council district regarding beautification projects for neighborhoods. Funding is available for city council districts for items such as picnic tables to allow neighbors to use the area. Good neighbors who have an historical interest in the cave surround Robber Baron. They have served as monitors for the cave and have volunteered during projects at the cave.

Bustamante Restoration Project Slide Show

Aimee Beveridge announced a slide show at her home on October 25th showing the restoration portion of the Labor Day project at Bustamante.

Newsletter

Joe Mitchell announced that he wants to put out the newsletter Passages twice a year. He requested that articles be submitted as they happen and not at the last minute. The target date for the next issue is the spring convention of the TSA. He would also like to change the format to tri-fold for direct mailing rather than mailing in an envelope. Attendees gave special thanks to Joe for the newsletter and to those who submitted articles, especially Ron Ralph and Jay Jorden.

National Cave and Karst Management Symposium

George Veni reported on the National Cave and Karst Management Symposium currently going on in Tucson, AZ. He said TCMA could benefit from attending the symposium. There is information on how agencies deal with issues involving caves, caving and field trips before and after the symposium, bat workshops taught by Jim Kennedy, and Project Underground workshops. George explained that Project Underground workshops are developing a team of people around the country to teach school age children about caves and karst. They use a karst model that compares the flow of water through sand vs. karst. George also reported on the current resort development planned for the border of Kartchner Caverns State Park. This development could potentially damage the cave. The AZ State parks board will offer to purchase the property and discussed condemnation if the purchase does not proceed. On a sad note, George Huppert was killed in a car accident on his way to the symposium. The symposium steering committee dedicated the proceeding to his memory and will establish a scholarship fund.

Committee for Cave Acquisition

After discussion of the philosophy on the purchase of caves and discussion of several caves available for purchase, a new committee of the TCMA was formed - the Committee for Cave Acquisition. Members include Geary Schindel, Ron Ralph, Rune Burnett, Bill Russell, Jay Jordan, and Carl Ponebshek. The first meeting is immediately following this TCMA annual meeting.

MINUTES
Board of Directors
TEXAS CAVE MANAGEMENT ASSOCIATION
Meeting Date: February 3, 2002
Location: REEH Tract, Cibolo Creek

Directors/Officers Attending	Absent:
Bill Russell, Director (Jan 2000-Dec 2004)	Jay Jorden, Director (Jan 2000-Dec 2004)
Linda Palit, Pres. & Director (Jan 2000-Dec 2002)	Julie Jenkins, VP & Director (Jan 2000-Dec 2002)
Bob Burnett, Director (Jan 2002-Dec 2002)	Walter Feaster, Director (Jan 2001-2003)
Sue Schindel, Treas & Direc (Jan 2001-Dec 2003)	**Noted Attendees:**
Aimee Beveridge, Director (Jan 2001-2003)	Allan Cobb
Joe Mitchell, Director (Jan 2002-Dec 2004)	Susan Souby, Secretary

Opening

The meeting was called to order by president Linda Palit.

I. Correction and Approval of Minutes

The minutes of the Annual Meeting on October 20, 2001 at Horseshoe Bend on the San Marcos River were approved with the addition of the amount of the 50/50 pot fundraiser.

II. Treasurer's Report

Sue presented a Balance Sheet as of 2/3/02 and an Income Statement dated 1/1/01 through 2/3/02. The Assets and Equity total $14,165.02 (no Liabilities). The income totals $11,560.55 less expenses of $2,477.74, for a net income of $9,082.81. Peter Sprouse has been paid for work done at Camp Bullis through 12/14/01. Sue has completed all tax forms for Peter. Linda will administer the contract for Camp Bullis now that Dan Hogenauer is no longer on the Board.

Everyone was reminded to submit in kind contributions to Sue. She doesn't have a way to document in kind contributions on the financial statement, but could summarize. The amount of in kind contributions will be used in grant proposals. Susan will develop a form for documenting in kind contributions.

Sue reported that TCMA now has a safety deposit box! Linda and Sue will have keys. Linda will make copies of the deed for Robber Baron and take the original to the safety deposit box. Linda will also locate the deeds for Oasis and Whirlpool, make copies, and transfer the originals to the safety deposit box.

III. Committee Reports

A. Membership Committee

Susan distributed a summary of the membership activity since September, 2001, which is attached. TCMA has received about $1,000.00 in membership dues and contributions since September. Thank you letters have been sent to everyone who paid dues or made a contribution. Susan will check addresses for the renewal letters not delivered and send out another request for renewal to those who did not receive a letter and to those who have not responded. She will send newsletters to the Advisory Board members and to the honorary life members as they have not received any correspondence from TCMA. Susan expressed concern that only those TCMA members attending the TSA meetings receive newsletters. When newsletters are distributed at the TSA Spring Convention, each recipient will sign a list indicating that they received a newsletter, and newsletters will mailed to everyone else.

B. RB Cave Gate

Linda signed the partnership agreement with US Fish & Wildlife and has $4,000-6,000 to use for development. She will set a date at the end of March or beginning of April for a work weekend to install the new entrance culvert. The installation will require the use of a crane. Linda currently has 2 leads on cranes. She is also looking for a culvert. Bob Burnett (Rune) will check on culverts he has seen at construction sites.

C. Cave Acquisition

Geary Schindel drafted a letter to be sent out on CAVETEX and to be published in the Texas Caver requesting assistance from the caving community in identifying caves available for purchase. Bill Russell suggested Geary contact Jerry Atkinson regarding cave leads.

The current members of the Cave/Land Acquisition Committee, in addition to Geary Schindel, include Ron Ralph, Bob Burnett, Jay Jorden, Bill Russell and Carl Ponebshek. The Board suggested that Geary set a meeting date for the committee.

IV. Old Business

A. Cave Gate Trip

Ron Ralph and Rune are continuing to work on the cave gate field trip that is part of the BCI symposium on cave gating. The field trip is on Friday, March 8th. Ron has incorporated the information provided by Mike Wharton in to the field guide. Rune

showed some of the pictures that will go in the field guide. Rune is currently working on reserving the buses used for transporting the participants. The challenge is determining the number of participants to expect since most people will wait until the day before the trip to sign up for the field trip. Linda will look for volunteers to help with the field trip.

B. Robber Baron Gate

See info under committee reports.

C. UT Land Agreement and Insurance

Jay Jorden has researched the cost of the additional insurance required by UT. It will cost $100.00 if UT will withdraw the requirement that we carry worker's comp insurance. Linda will contact Walter Feaster and Jay to proceed with the purchase of the additional insurance and with the agreement with UT.

D. USAA Cave Preserves

Linda has been in contact with USAA regarding TCMA managing the USAA cave preserves. There are 3 caves that USAA is endowing to Government Canyon and 5 caves that would be included in a management plan: Hills & Dales, Helotus Blowhole, Helotus Hilltop and John Wagner I & II. Linda has reviewed the management requirements set up by the U.S. Fish & Wildlife Service and has lined up personnel for the monitoring, the baseline wildlife studies, and the biological assessments, which are required every 2 years. The management arrangement would require a subcontract similar to Camp Bullis. There is $38,000 alloted yearly to pay for management. Currently the management plan allows access to the caves only for monitoring and not for recreation. Linda speculated that once TCMA was managing the caves, USAA might want to transfer title to the caves to TCMA. Also a woman with the San Antonio Land Trust has expressed interest in being involved with the preserve, but Linda doesn't see the need to work with the SA Land Trust at this time.

E. Other? - Karst Model

Aimee set up the karst model that she received through a grant from the Conservation Section of the NSS. The model illustrates with colored water the flow of groundwater through sand vs limestone, complete with wells pumping contaminated water. It's a fun way to 'see' underground and Graham and Aspen Schindel quickly became experts in the operation.
Aimee will make copies of the manual. inventory the pieces that don't fit in the nice hard plastic case, and make a case for the additional pieces. She will set the model up at the TSA Convention in April to demonstrate its operation. Aimee will solicit volunteers to take the model for teaching engagements. She will also write an article for Passages and the Texas Caver. Allan Cobb will work with Aimee in developing a teaching manual to accompany the karst model.

V. New Business

A. TCMA Web Page Location

The TCMA web page is currently suspended until the breech in security can be corrected. Linda will keep in contact with Bill Bentley and Annmarie Mikelski, our webmaster, to determine whether TCMA needs to move the web page or set up another one. Joe Mitchell volunteered to give Annmarie current information on TCMA so she can keep the web page updated.

B. Passages for Spring TSA Meeting

The deadline for articles for the spring issue of Passages is April 10th. The articles so far include: colume on TCMA - Linda; karst model - Aimee; trip report on REEH tract - Joe; cave gate field trip - Ron; and status of Robber Baron - Linda.

C. Land Trust Field Trip

The Texas Land Trust is holding a rally in Austin in October and asked TCMA to organize a field trip to a cave. The field trip can be 1/2 day or a full day. The Land Trust will provide food, transportation, and insurance. The Board discussed Whirlpool Cave as the field trip destination. Rune and Aimee will think about leading the field trip to Whirlpool.

D. Other - Report on Austin Caves

Bill gave a report on the status of the Austin caves. Whirlpool continues to get lots of visitation. Lost Oasis is now accessible. A bill has been presented to Lumberman's (LIC) for Mike Wharton's work in the Buttercup Creek Subdivision, and TCMA should get paid for the work. LIC has almost completed divesting of cave properties in Buttercup Creek and the cave properties will be completely turned over to the City of Cedar Park. There is a new person in the City of Cedar Park government with whom Bill will meet soon. Bill expects this person to be a good contact for TCMA with the city.
In month or so the caves in the Village of Western Oaks will be donated to either TCMA or the Edwards Aquifer Barton Springs Conservation District. Jay has been contacted and says if TCMA receives the caves, they can be added to the insurance. Bill said if the conservation district gets the preserve, they may still turn it over to TCMA for management. The preserve would come with an endowment, perhaps $15,000 per year, which should be enough to pay for management.
TCMA has an informal management agreement with the City of Austin on the Blowing Sink tract, which includes approximately 240 acres and a number of caves. Bill is reluctant to encourage visitation until a formal MOU with the City is set up. After a MOU is signed, he will set up trips and schedule clean ups.

Small Projects at the Mayberry Tract

The Board agreed that they are interested in participating in small projects at the Mayberry tract. They would be similar to the project this weekend at the REEH tract. Linda will schedule the weekend projects.

VI. Set date and time for next meeting

The next meeting of the Board of Directors of TCMA will be held during the TSA spring convention on the last weekend in April (April 27-28) at Colorado Bend State Park. Linda will set up the exact time and select a place.

The Board and Officers of the Texas Cave Management Association express their appreciation to those who contributed to the TCMA in the past year:

Life members making generous donations
Donna Anderson
Bruce Anderson
Michael Anderson
Bill Bentley
Bob (Rune) Burnett
George Crosby
Joann DeLunna
Walter Feaster
Rod Goke
Dan Hogenauer
Jay Jorden
Joel King
Pinto Koelling
Dave McAdoo
Dave "Cave' McClung
Linda Palit
Dale Pate
Carl Ponebshek
Ron Ralph
Tag Swann
Patricia Wilson

New members:
Randy Baker
Tom Brown
Mark Gee
Ryan Lozano
Tommy Joe
Annmarie Mikelski
Mike Moore
Mike Quinn
John Serur

Special thanks to
George Veni and Associates
Chris Thibodaux
For their business memberships

Membership renewals:
Robert Albach
Linda Aldrich
Jacqui Bills
Aimee Beveridge
James & Karen Clary
Rick Corbell
Bob Cowell
Fran Hutchins
Keith Heuss
Julie Jenkins
Carol Henderson
Jack Johnson
Cindy Lee
Joe & Evelynn Mitchell
David & Lillis Moulton
Emily & Kevin McGowen
Kurt Menking
Sue & Gary Schindel and family
Justin Shaw
Peter Sprouse
Susan Souby
Steve Taylor
Mary Wright & Chris Cantrell

Texas Cave Management Association

Since 1985, dedicated to the conservation and protection of our underground resources.

Cave Science - Cave Management - Cave Protection

TCMA welcomes and encourages cavers to become new members. We have dedicated years of field work and research to the preservation and protection of caves for the caver, the community, and the future.

Regular - $15.00 year
Associate - $10.00 year
(Students Under 21)
Family - $22.50
Institutional (Non-profit) - $50.00
Corporate - $100.00

Email: **tcma@cavetexas.org**
Web Site: **www.cavetexas.org/tcma**

Texas Cave Management Association Inc
PO Box 202853
Austin, TX 78720-2853