June 1997

Capital Caver, No. 4, June 2007

William H. Russell

The Capital Caver

Number Four
June, 2007

Challenge of Small Caves

Saj Pierson in entrance to Hackberry Hole

The Capital Caver Number 4

The Capital Caver is published very irregularly by the Texas Cave Management Association (TCMA) to inform TCMA members about issues involving Texas caves and karst. This issue of the Capital Caver contains an editorial to remind cavers that by no means have all Texas Caves been discovered. There are many more caves still to be found, and many sections of known caves have not been well checked. Then the relatively unstudied biology of the Barton Springs Segment of the Edwards Aquifer is considered, and the Barton Springs Segment is divided into four potential habitat zones based on food energy input and aquifer characteristics. The principal concern of this issue is how to report and compile cave information. In the past the TSS has provided information on all caves in a relatively large area through printed reports. But, advances in digital publishing and distribution have made other options attractive, and these alternatives are examined.

The issues examined in the Capital Caver are the responsibility of the editor, and the opinions expressed are the responsibility of the authors of the individual articles, and do not necessarily represent the opinions or concerns of the Texas Cave Management Association. Unsigned articles are the responsibility of the editor. Material in the Capital Caver is not reviewed or authorized by the TCMA.

Table of Contents

Photographs:
Cover: Bill Russell
Other un-credited photographs: Bill Russell and Julie Jenkins

Old miner song from Preston Forsythe in email 6 Jan 2006
Preston had suggested that the old mining song could easily be refurbished into a cave song, and here is my version of the caver edition:

Old time miner song:	Caver version:
Carbide lamp upon his head	Carbide lamp upon his head
Miner Jim as soon be dead	Caver Jim as soon be dead
As in the dark	As in the dark
Of a coal mine night	Of a black cave night
Without his trusty	Without his trusty
Carbide light	Carbide light

Carbide Lights were like a living thing, they provided light and warmth but were demanding; a caver had a personal relationship with their carbide light. I can remember accidentally breaking open a seam and pasting the break over with cave mud to exit the cave. "Without his trusty diode light" wouldn't be the same; or would it? Do people romanticize their first experience? Will cavers in the 22nd century be nostalgic about their wonderful old-fashioned LED light? In my opinion, LEDs are an improvement, but they are a cold lump of technology and don't warm the hart, much less your cup of coffee. Too much technology and too little heart; a problem for everyone. Except maybe Republicans.

Exploration and Caving

In a recent video Bill Stone, currently of Austin, gives a passionate defense of exploration as human feet on the ground. (Even as he works on an autonomous cave exploration vehicle) (Check it out: Google Bill Stone on Google video) He extols the virtue of caving as the last frontier of human exploration, and then talks of month long expeditions to the jungles of Mexico. This might give the impression that all the caves left to explore are like J2, thousands of feet deep and hidden in the mountains of Mexico. This is misleading. You don't need thousands of dollars, sponsorship by several corporations, and a crew from six countries to find new caves to explore.

You can explore someplace no human has ever seen right here at home. There are two easy, low cost ways to do this. One is to look for new caves. For the unimaginative there are organized cave hunts, like Colorado Bend and Government Canyon. But with a little thought you can find new caves on your own. Do you know any hunters? Ask them about caves where they hunt. Did any of your friends, coworkers or classmates grow up in a small town in west Texas? Talk to them. When you stop for gas in west Texas, tell the slackers hanging around the station that this looks like cave country to you. Stop by the real estate office to ask if they have any land with caves. Ask the friendly police officer if he has ever been on a cave rescue. If they don't know about caves, ask them who does. Most of what you find won't be super exciting, the excitement comes from the hunt; but every once in a while you will find something real nice. And, a little squeezing around in most caves out in the country will have you in unexplored territory.

The other way to explore into the unknown is to dig. Most cave passages don't just end, they are filled with dirt and breakdown. The careful examination of most caves will find places where the cave continues, but the passage needs some enlargement. Airflow is an especially good indication that the cave continues. The air is going somewhere. One way to check for airflow, now that smoking is

discouraged in caves, is to bring an incense stick, available at most grocery stores. Light the incense at the entrance to check for airflow. Next try the ends of the passages and each crack in the wall to see where the air is going. Then follow the air. Many depressions in the surface will lead to new caves with a little digging. Again, airflow is a good sign. Also, if a cave entrance is in a sinkhole, the cave might continue across the sinkhole, so dig on the side across from the entrance.

When Texas caving was first invented in the 1950's children were expected to" go out and play." They invented their own games with flexible rules. There was no place to sign up where the adults would take care of you; you made do with what you had. Caving fitted into this scheme, and cavers went out and found many wonderful caves. But times changed and now leaving your child without adult supervision is a form of child abuse; and the world is unsafe and dangerous. For all their lives the new cavers of today signed up for activities, they didn't do it on their own. These ideas are in the culture and cannot be entirely eliminated, but individuals can rise above their cultural limitations, and progress is possible, though frequently difficult. But actual exploration was never easy.

Habitat Zones in the Barton Springs Segment of the Edwards Aquifer

Introduction

The Barton Springs Segment of the Edwards Aquifer is about 155 square mile area located just south of the Colorado River in southern Travis County and northern Hays County, Texas. This aquifer is not just a relatively uniform sponge-like network of water filled openings; the complex interaction between stratigraphy, structure and surface erosion has produced a series of differentiated habitats. Geologic mapping and water tracing by the Barton Springs/Edwards Aquifer Conservation District (BS/EACD), combined with observations from caves, such as Blowing Sink Cave, has made it possible to divide the Barton Springs segment into biological habitat zones. Each of these zones has a unique environment, and each can be expected to have a distinctive fauna.

In the recharge zone where the Edwards Limestone is exposed at the surface water enters the aquifer through innumerable joints, fractures and sinkholes in the exposed surface of the limestone. Overtime many of these fractures, especially those located beneath drainages and in favorable areas near faults, have become enlarged to form caves that can rapidly transmit large amounts of organic material into the aquifer.

As a result the aquifer beneath the recharge zone is relatively rich in organic material and can support a diversity of animals, including some not specifically adapted to the cave environment.

In the artesian zone where the aquifer is covered by non-soluble rocks, organic material cannot directly enter the subsurface. In these areas most nutrients have to be carried a considerable distance back under the cap rock, resulting in a lower density of nutrients and favoring animals well adapted to the low energy cave environment. In contrast to the general nutrient poor environment, there is an unusual zone along the Bad Water Line, at eastern edge of the aquifer, where the water in the aquifer comes in contact with the highly mineralized water in the Edwards Limestone down dip to the east. Along this zone there is considerable organic material derived from organisms that live on petroleum and sulfates from the mineralized water. The artesian zone also contains conduits that can transmit large volumes of water with flow velocities of up to several miles per day. The varied conditions in this zone can be expected to support a diverse, cave-adapted fauna.

Habitat Zones

The Barton Springs segment of the Edwards Aquifer can be divided into at least four general habitat zones based on the geology and the concentration of organic material. Areas in the Recharge Zone along the western edge of the aquifer receive the most surface infiltration and have the highest level of nutrients. To the east of this food abundant zone there is the nutrient poor Artesian Zone developed beneath the overlying impervious rocks. These east-west zones can be divided into two sections, the north most or downstream zone, and a southern or headwaters zone in Hays County.

The character of the aquifer changes roughly along the Travis-Hays County Line. To the north of the county line in Travis County, aquifer conditions are more consistent, and while water levels rise after major rain events, conditions return relatively rapidly to a narrow normal range. To the south in Hays County groundwater conduits are not as well integrated and the zones are not as distinct. Large amounts of recharge from Onion Creek can greatly influence the conditions in the aquifer, including the water level and direction of water flow. At times it is likely that recharge from Onion Creek even flows south to San Marcos Springs.

This division gives four general habitat zones the Northern Vadose Habitat Zone, or Blowing Sink Zone, the portion of the aquifer in Travis County roughly west of Brodie Lane, and the northern Phreatic Habitat Zone, or Sunset Valley Zone, the area to the east of Brodie Lane where the aquifer is mostly covered with imperious upper Cretaceous rocks. To the south in Hays County is the Southern Vadose Zone or Rutherford Ranch Zone and to the east is the Southern Phreatic or Buda Habitat Zone.

The Blowing Sink Habitat Zone

The Blowing Sink Habitat Zone extends from the western edge of the Edwards outcrop along the Mt. Bonnell Fault almost to Brodie Lane on the east, and from Barton Springs and the Colorado River in the north, to the Hays County Line in the south. This area is characterized by surface sinkholes and caves that recharge water along with considerable organic nutrients. Much of this water flows down vertically to the base of the aquifer and then laterally east down the dip slope of the Edwards. In the northwestern part of the zone is the Cold Spring Compartment that extends along the western part of the aquifer and drains into Cold Spring along the Colorado River.

More is known of the Blowing Sink Habitat due to the ability to directly investigate this zone through Blowing Sink Cave. This cave descends 250 feet to near the base of the Edwards Limestone where it encounters a permanent stream, Eileen's River, perched on insoluble beds in the Dolomitic Member near the base of the Edwards Limestone. This stream contains considerable organic mater, mostly in small particles, but some areas there are concentrations of recognizable leaves and twigs.

Two salamanders genetically similar to *Eurycea nana* from San Marcos Springs have been collected from Blowing Sink Cave. Apparently, the relatively nutrient rich streams like Eileen's River, flowing down the dip of the Edwards Limestone provide a habitat so similar to the surface that *E. nana*, not a highly adapted cave salamander can out compete the more cave-adapted animals.

The Sunset Valley Habitat Zone

The Sunset Valley Habitat Zone extends from near Brodie Lane on the west to the Bad Water line on the east, and from Barton Springs on the north to the Hays County Line on the south. Most of this zone is developed in water filled cavities deep below the surface, and is covered by insoluble rocks that block direct recharge. The Sunset Valley Flow Route, a large conduit that carries water to the north is developed in this area. Dye tracing experiments have indicated this flow route ends in the

vicinity of Old Mill Spring, the south most of the Barton Springs.

This spring is the type locality of *E. waterlooensis*, a highly cave adapted salamander similar to *E. rathbuni*, that inhabitants a deepwater habitat to the south in the vicinity of San Marcos. It is likely that *E. waterlooensis* inhabits the Sunset Valley Habitat Zone as it appears to be adapted to life in a deep, nutrient poor environment.

The Rutherford Ranch Habitat Zone

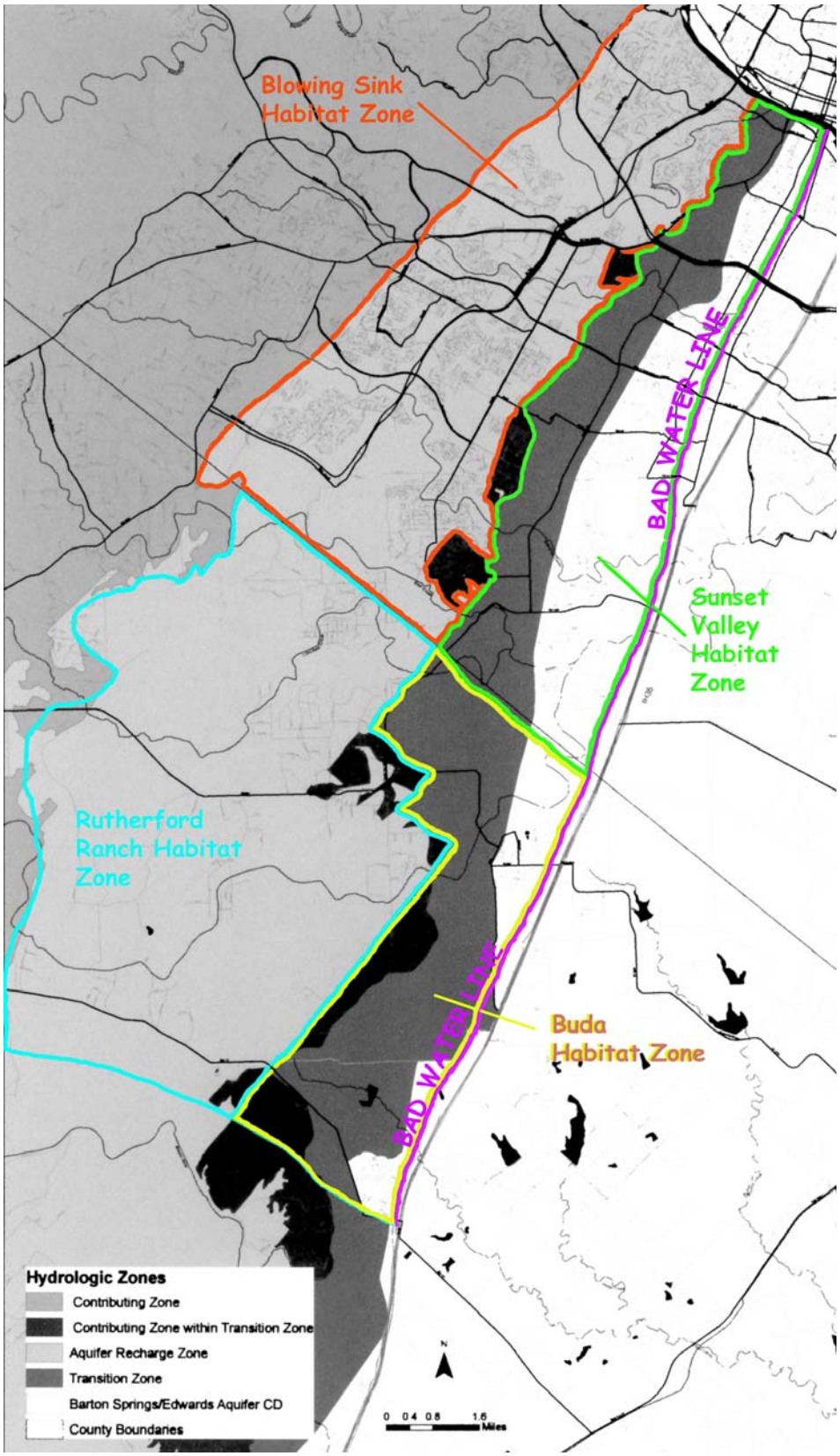
The Rutherford Ranch habitat Zone extends from the Travis-Hays County line to the southern boundary of the Barton Springs Segment north of the Blanco River. It extends from the western edge of the Edwards outcrop to just west of Ranch Roads 1626 and 2770. This area is characterized by a relatively steep slope of the potentiometric surface down to the east. In much of this area the base of the Edwards is above the surface of the water table to the east; and recharge from the numerous caves and solution features essentially flows down dip to the Buda-Kyle area. The fauna of this area should be relatively similar to the Blowing Sink area to the south, though the karst is in general less well developed. This area acts as a nutrient rich bridge that allows *E. nana* type salamanders to migrate south to the Blowing Sink area.

The Buda Habitat Zone

The Buda Habitat Zone extends from the Travis-Hays County line on the north to an indistinct ground water divide in the vicinity of Kyle. It extends west from the Bad Water Line for about three miles to just west of Ranch Roads 1626 and 2770. This area is characterized by a relatively constant level of groundwater, with significant cones of depression around Kyle and Buda caused by municipal pumping. In general, the slope of the groundwater surface is only a few feet per mile. The low slope of the water table is not due to well-developed conduits, but due to a limited amount of groundwater flow through the area. This area acts as a barrier that keeps the San Marcos Springs water from flowing north to Barton Springs and it is also a biological barrier that separates the San Marcos fauna with *E. rathbuni* as the top predator from the Barton Springs fauna with *E. waterlooensis* as the top predator. What actually lives in the Buda Habitat area is essentially unknown.

The Bad Water Line Habitat Zone

The Bad Water Line Habitat zone is likely the most unique zone in the aquifer, but so little is known of this zone in the Barton Springs Segment that it is more of a hypothetical zone. This zone is located deep below the surface along the eastern edge of the aquifer. It is difficult for surface organic material to reach this zone, but it is rich in nutrients derived from the mineralized waters to the east of the Bad Water Line. In the San Antonio Area there is enough organic material along the Bad Water Line to support two species of blind catfish. In the San Marcos area this zone is likely inhabited by *Eurycea robusta*. This salamander is unlike almost all other highly cave adapted animals; it is built like a small alligator, with a massive body and thick muscular legs. This body type indicates the robusta lives in an area of abundant food, where the ability to quickly reach the food is an advantage and energy consumption is not as critical. Little is known of this zone north of San Marcos, but efforts should be made to sample wells drilled near the Bad Water Line.



Habitat Zones

Conclusions

The fauna of the Barton Springs Segment has not been well studied despite the presence of *Eurycea sosorum*, the Barton Springs salamander, an endangered species restricted to Barton Springs in Austin. Much of the biological effort is concentrated on protecting this species, but clearly a better knowledge of the fauna of the aquifer away from the springs will help protect *E. sosorum*. The model of the Barton Springs segment of the Edwards Aquifer as a series of interconnected habitats can guide research and help understand the distribution of the fauna. During dry periods both Upper Barton Spring and Old Mill Spring stop flowing and the salamanders are forced to retreat into the aquifer where they have to compete with the inhabitants of the aquifer. How much of a refuge the aquifer will provide depends on what lives there. The distribution of *E. sosorum* away from the springs into the aquifer is not known.

The study of the fauna of the Artesian Well at San Marcos had found a very diverse invertebrate fauna, and similar populations may exist to the north. More studies like Dr. Gluesenkamp's survey of the fauna collected from wells and Zara's study of Blowing Sink Cave are needed. Our knowledge of the fauna of the aquifer is slowly increasing though studies of caves and the sampling of wells, but much remains to be learned, especially of the species that support the salamander population.

Salamander Photos

E. waterlooensis. Photo © Suzanne L. Collins, Center for North American Herpetology

E. rathbuni. Photo © Suzanne L. Collins, Center for North American Herpetology

E. nana Photo credit not available-Texas Parks and Wildlife Department

Texas Cavers FAQ's

These Frequently Asked Questions were posted on the caver listserv by Locklear, but have yet to be answered. Hundreds of cavers on Texascavers, and doubtless thousands elsewhere share in the quest for knowledge, so Bill Russell has researched the speleological authorities and as a public service compiled the answers to these frequently asked questions to banish the ignorance. In the true "Locklear" spirit some of the answers **actually** contain information. Be informed.

1. Does the Texas Speleological Association (TSA) lead caving trips?
You want egg in your beer? Aren't projects and a convention enough? Be grateful for what you get. Most cave trips involve only a few people, and are best organized by grottos or individuals. The State of Texas doesn't collect your trash.

2. Why are Texas caves so warm?
They are directly above the very hot center of the earth.

3. What is a closed cave?
A cave without an entrance is a closed cave.

4. What is an arm-chair caver?
If you live in a place where all the good caves are too far away, you are an arm-chair caver.

5. What is a professional caver?
A professional caver is someone who has to be paid to go into a cave.

6. Is there a speleologist in Texas?
Yes- Jim Quinlin was a speleologist in Texas, but he left, and now he is dead. This alarmed other speleologists and now they are afraid to leave Texas, so we have a good supply. Only George Veni has had courage to test the curse of Quinlin. We wish him luck.

7. What is so great about the Texas Caver?
If there is nothing else to talk about, the TC will provide a topic.

8. What is the Activities Newsletter?
A newsletter that was composed entirely of electrons and pixels.

9. Are there vampire bats in Texas?
Not normally, but with global warming, watch out. A rumor has it that Rick Remington once collected a vampire bat in an abandoned RR tunnel south of Shumla.

10. Can I get hurt in a Texas cave?
No, see No. 11.

11. Why go caving in Texas?
The smaller the cave, the less the chance of accident. And, if when you reach the end of the cave your feet stick out of the entrance, rescue is less of a problem.

12. Why are some Texas cavers selective about who they take caving?
Experience.

13. What is the single best source of Texas Speleology?
The NSS Convention Guidebook, The Caves and Karst of Texas, available from the TSS.

14. What is a "contact person"?
If you break formations the TSA will call a contact person and after a little contact you will never cave again.

15. Are cotton clothes shorts proper caving attire?
It depends on the cave temperature, the amount of water and crawling encountered, as well as the sex and religion of the caver.

16. Which cave has the most buried treasure?
The seven golden cities of Cibola were never found by the Spanish because they were hidden in caves! One of these cities of gold is located in a cave west of Georgetown, and one trip a year enables the TCMA to buy all the caves they can find.

17. Do I have to be a US citizen to go caving in Texas?
Our president tells us terrorists threaten our way of life, so we don't want them in our caves.

18. Do cavers really pack their own waste?
A few share, but most pack their own.

19. What is the "Posse?"
The posse is a group of wild Austin cavers that have inspired several generations.

20. Is there a "Texas Cave Rescue?"
There was a Texas Cave Rescue in Kendall County, but the records have been sealed.

21. What is a "trip report?"
A trip report is used to report minor accidents.

22. Are all Texas caves made of limestone?
All Texas caves so far discovered are made of air, usually with extra carbon dioxide and water vapor, and sometimes a dash of radon.

23. Which Texas cave has the most entrances?
A gypsum cave in Palo Duro Canyon has many entrances where sections of the passage have collapsed, but some of these collapse areas are so large they may divide the cave into separate caves. The question cannot be answered until this issue is resolved.

24. Which Texas cave is the oldest?
Likely a phreatic cave in the Guadalupe Mountains of West Texas.

25. Is "Enchanted Rock Cave" a real cave?
Anything not online is real.

26. What is a listserve?
A place where every caver is in contact with the accumulated wisdom of all other cavers. The printed page is so 20th century.

27. Is caving a sport?
Since its beginning in France, caving has been a sport in service to science.

28. What is speleo-this and speleo-that?
A "spelo-this" is an implement for digging, and a "spelo-that" is used for rappelling. Both of these activities can be life threatening, so do not use the spelothis or the spelothat with out proper instruction.

29. Does it get any better than the Edward's Plateau?
No, it was the sight of the Edwards Plateau that inspired Schiller to exclaim "Joy, thou beauteous spark divine!" Even today cavers have been known to jointly shout as they drive up onto the plateau "Drunk with ardor, we draw near, goddess, to thy shrine!"

30. How many "really good" caves are there in Texas?
The "really good" caves are top secret, and if I told you I would have to kill you.

Questions by David Locklear/Answers by Bill Russell

Small Cave Coverage in Reports

"The underground roads
Are as the dead prefer them,
Always tortuous."
W. H. Auden

Travis County currently has about 330 caves and most of them are small, the median length is 41 feet. The small caves are essentially ignored and seldom visited. A few have visits due to the presence of endangered or threatened species, or their location in a park or public area. The treatment of these small caves in reports that cover a large area presents many policy choices. The Texas Speleological Survey (TSS) policy has been to include essentially all information on each feature in an area report. And, in the past, when most Texas cave counties had only a few known caves and many of these had no map or photographs, it was possible to cover an entire county in a relatively brief report. After years of work by many cavers there are now many counties, especially along the Balcones Escarpment, that have hundreds of caves with maps, detailed descriptions, and photos, in addition to much biological data. This expansion of cave data will necessarily change the way cave information is presented. There are several options.

Option One is to continue to cover large areas, as a county, and present essentially all information on each feature in the report. This means that each cave has a map, a complete description with geology and history, a faunal list, and ideally a photo or two. This level of coverage requires almost a page for even the least significant cave and the average number of pages for a large area will be about two pages per cave. To cover Travis County under this option would require a report of over 600 pages.

Option Two is to include all the information on each cave, but just publish reports on smaller areas. Travis County is divided into USGS Quadrangles, and reports could be published on the caves of each quadrangle or of several adjacent quadrangles. If quadrangles were not convenient, local geographic areas could be devised as Caves of the Four Points Area, or Caves of the Jollyville Plateau. The TSS has used this option in the Caves of the Langtry Area and the forthcoming Caves of the Indian Creek Area.

Option Three would be to publish on large areas but only give complete information on the major caves, and caves of special interest; then include only a brief description of the rest. This would provide a report that would be attractive to recreational cavers as all the caves of interest to them would be included. The major caves could have additional photographs, and the report would still be of modest size. This level of information is helpful for many users, as the cave geology and biology can be summarized to provide useful information to cavers and scientists alike.

Option Four is to provide the information as in Option Three, but to include a CD with complete information, or establish web pages with the additional information. A CD is convenient in that the purchaser of the report will have complete information. It might be worthwhile to put the entire report online, so that those with a modest need for most cave information could just research the online version. This would allow for post publication update and the inclusion of much more information. Much of the information in the TSS databases could be offered online with only slight modification to delete sensitive location and owner data. The downside of the online option is that it would require maintaining many pages of material that would not be frequently used.

The TSS needs to decide on the intended readers of the TSS reports. It is no longer possible to publish paper reports on many large areas with a level of detail that will satisfy all users. The recreational caver, the cavers who are looking for new caves, any one trying to identify a specific feature, as well as geologists and biologists all have different needs. Currently most of the publication sales are to the more serious recreational cavers, and most of the information on small caves is of little interest to them. And, in any case, most of the other users will need to contact the TSS for additional material. A county report in any format would still be useful as it can provide general cave information along with a biological and geological summery over a large area, and allow all users to be much more precise in their request for information.

Example Reports

The difference between options one and two level of information and the options three and four level are shown in the following example of reports from Travis County. The first four reports are as they would appear in an option one or two survey, and the next two pages are an example of the same caves reported in the context of brief descriptions in an option three or four report. In an actual option one or two report there would also be a biology section for each cave with a faunal list that would add at least a paragraph to each long cave description.

Complete Reports

Bullet Cave

General

Bullet Cave is located on Barton Creek upstream from Airman's Cave. The entrance to the cave is formed under a slight overhang in a bluff above the creek where the entrance crawl opens into an alcove at the top of a steep slope 30 feet above the creek. From the entrance a passage 2.5 feet high and two feet wide extends for 30 feet to the Ritual Room. This room, developed along a fracture perpendicular to the entrance crawl, is up to eight feet high, 15 feet wide, but only about 5 feet long. From this room the easiest way on is a crawlway at floor level that extends for about ten feet to a junction. A slope up to the left leads to a small parallel passage that extends back to the Ritual and forward for about 15 feet to end in a solution matrix, an unpromising dig. From the junction the lower passage extends to an opening up to the right into an area of slab breakdown. It is possible to squeeze up and around the slabs of breakdown for a few feet, but there is no obvious way to continue, and no strong airflow. The total length is 100 feet and the depth-actually height above the entrance- is 9 feet.

History of exploration

The cave first came to the attention of cavers in 1977 when Roy Jameson noticed airflow from a small hole in a cliff above Barton Creek. He dug at this lead following a mostly silt filled passage with only a few inches of air space above the silt. He enlarged this passage to barely passable size for thirty feet to a room filled with broken rock. The cave was named after a bullet (an unfired .38 with shell) found in the entrance during an early visit. Several years later Bill Russell and Craig Bittinger decided to continue the dig and constructed a cart from boards and skateboard

wheels to remove material from the cave. The entrance crawlway was enlarged and the rocks in the first room were removed. At one time during the dig Craig was standing at the entrance pulling on the rope attached to a cart full of rocks which had just caught on an obstruction. To free the cart, Craig gave a great tug on the rope, but the rope slipped off the cart, and Craig hurtled backward down the cliff, fortunately suffering no serious injury. It could not be decided if this was a cave accident or not, since Craig was not actually in the cave when he fell. Soon after this incident, it was found that the airflow through much of the cave did not come from the terminal breakdown, but rather from a crack in the ceiling, and so efforts to enlarge the cave were again abandoned, but not before the entrance passage had been enlarged to crawlway size and the fissure at the end of the crawlway cleared of breakdown to form a comfortable room over six feet high.

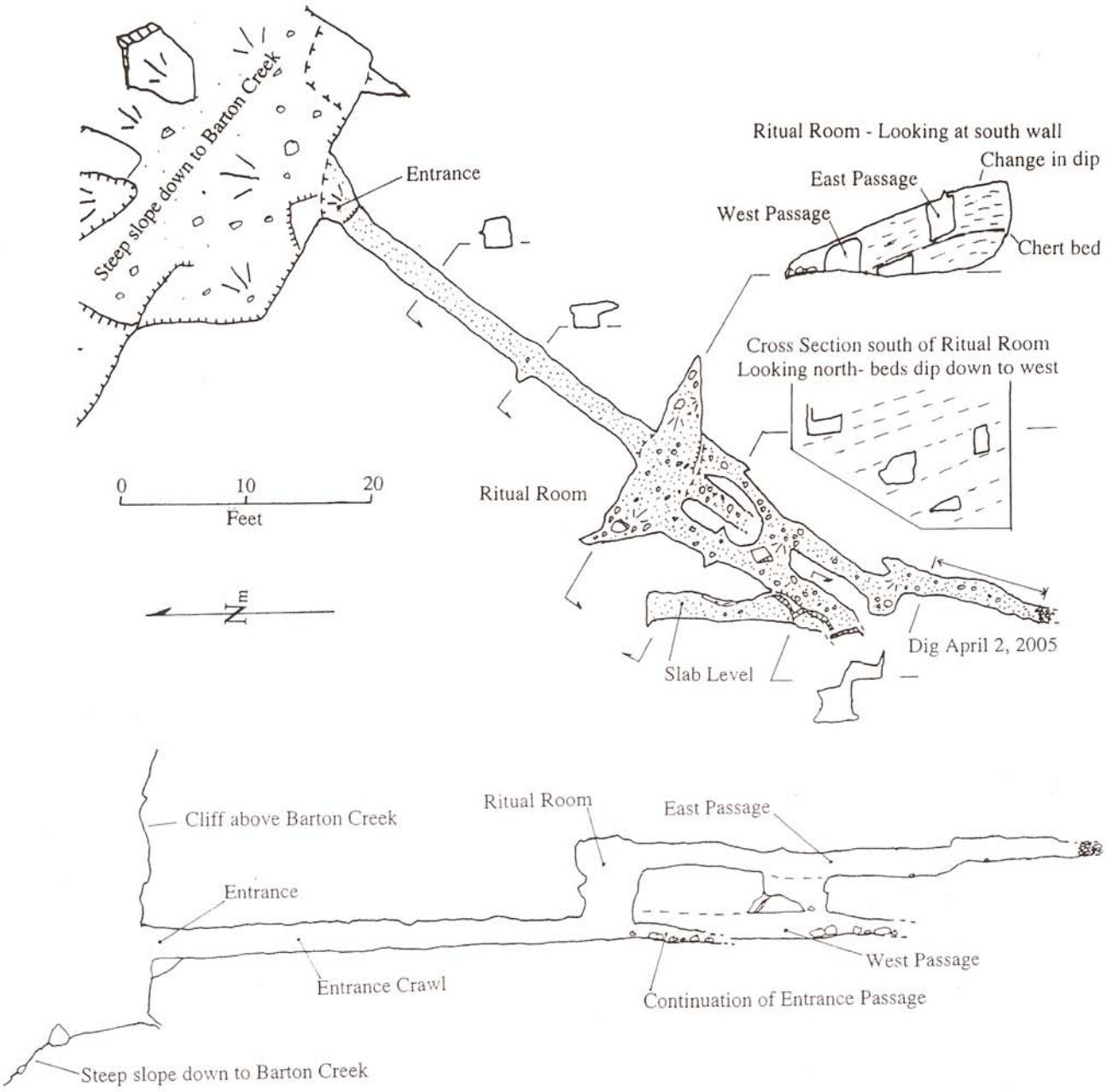
In July of 2003 Edward Gemar and a friend dug in the soft material in the back left end of the cave following airflow. After about six feet they could see ahead to what appeared to be open passage. When they tried to push through they dislodged numerous rocks that almost trapped them in the dig. They asked Bill Russell about the problem and he checked the dig and found it less than a foot high. They had dug the smallest possible dig. To go through the dig it was necessary to push on the surrounding unstable material. The dig was though a matrix of fist to football sized nodules surrounded by small lumps of rock and solutionally altered powdered limestone. Pressing on the nodules would break them loose from the matrix and they would fall into the dig. Bill Russell stuck a crowbar between two nodules and wiggled the bar and about fifty pounds of rocks fell, blocking the entrance to the dig.

The cave was mapped by Ryan Reed, Bill Russell and Viktor Simkovic on April 2, 2005. The same people also dug in Gemar's lead and were able to remove loose rubble and solution matrix for about six feet to where the opening narrowed and the fill became more solid.

The way ahead did not appear promising. The only somewhat promising area is the southwest corner of the cave where the cave is blocked by a massive collapse. There is some air flow through the terminal breakdown and a smoky fire of leaves was started to see if the air was reaching the surface, but no smoke could be detected on the surface. Digging ahead at the level of the western crawlway might lead to a way past the collapse, and it is possible that other ways exist through the collapse, but there is no strong airflow to indicate a way through.

Geology

Bullet Cave is located in the same stratigraphic horizon as Airman’s Cave, the "upper solution collapse zone," developed at the base of the Leached and Collapsed Member of the Edwards Limestone, but at Bullet Cave, this zone is higher on the cliff, due to a minor fault just west of Airman’s Cave. Bullet Cave is developed where this solution zone crosses an area of fracturing, an especially favorable location for groundwater flow into Barton Creek. Bullet Cave, located at a higher elevation than Airman's Cave, could be part of an older flow path long abandoned and much degraded by collapse and erosion.



Bullet Cave

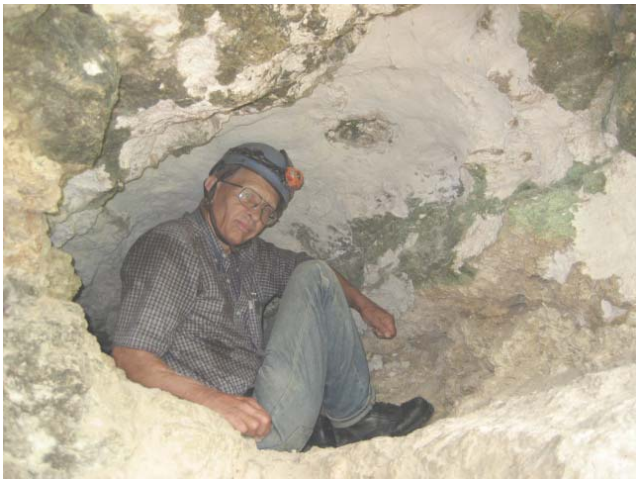
Travis County, Texas

Suunto and tape survey
April 2, 2005

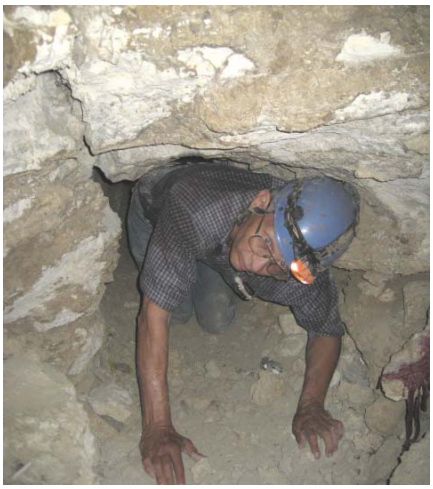
Ryan Reid
Bill Russell
Viktor Simkovic

University of Texas Grotto, NSS

Bullet Cave Photos



Bill Russell in entrance of Bullet Cave



Hackberry Hole

General

Hackberry Hole is a small cave located in southern Travis County. The cave is 60 feet long and 15 feet deep, composed mainly of a low central room about 30 feet long, with several alcoves and extensions. The cave does not appear to extend much beyond the mapped extent, as evidenced by the lack of airflow. When visited in the fall of 2006 the cave was noticeably warm, likely due to the shallow depth that allowed the summer heating of the surface to warm the ceiling of the cave. The floor of the main room is composed of washed in black surface soil and small rocks. The cave was very dry when visited after a long period of little rain. Cave biology was limited to numerous cave crickets on the ceiling and several cave adapted millipedes, *Cambala speobia*, found on raccoon scat in the innermost lower portion of the cave where there was still a small amount of moisture. This small moist area also had numerous ants, somewhat smaller than fire ants. A shallow depressed area about 20 feet in diameter surrounds the entrance, but the area around the cave has very low relief and the exact drainage area is difficult to determine, but it does not appear to be large.

Description

Hackberry Hole is located on a flat upland surface and there is no evidence of concentrated drainage entering the cave, though over time considerable surface material has been carried into the cave. The cave is entered through a shallow entrance sink 2.5 feet wide and about four feet long. A hackberry tree almost two feet in diameter fills the east end of the entrance, and the rest is mostly filled with dirt, leaves and loose rocks, but it is possible to squeeze into the cave along the south side of the entrance. The entrance is on the north side of the main room of the cave, and a slope of dirt and small rocks leads down to the floor of the main room, four feet high at the center and 20 feet wide including a low alcove at floor level. This room consists of an open area four feet high and 15 feet wide that extends east and west from the entrance. About six feet west of the entrance the room appears to end in slabs of breakdown, but a low opening at ceiling level continues for ten feet. To the east of the entrance the floor slopes downward under a series of ceiling ledges. The ceiling lowers faster than the floor and 25 feet east of the entrance the ceiling drops almost to the dirt floor. A low opening about six inches high continues for a few feet to where the cave ends, except for a small drainage channel much too low to follow. Along the south wall near the end of the main room is an extension that extends south from a rubble filled trench along the wall for about ten feet to a small room, large enough to turn around in.

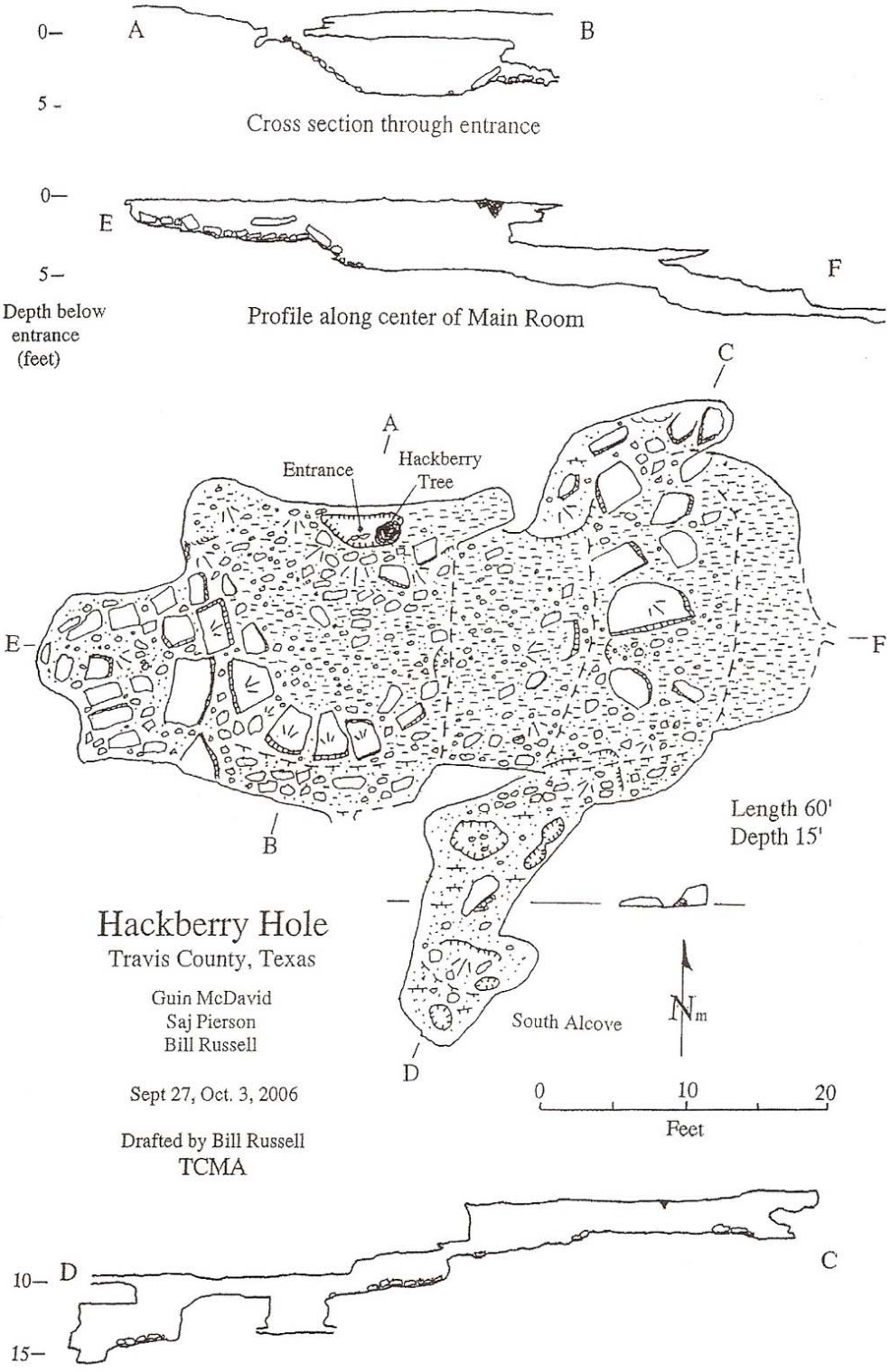
Geology

Hackberry Hole is developed in the Grainstone Member of the Edwards Limestone, and appears to be an isolated solution pocket, rather than a section of a conduit. The cave was formed under phreatic conditions as evidenced by the solution etching of the ceiling and indentations along soluble zones. There has been considerable filling of the cave with sediment, mostly black surface clay.

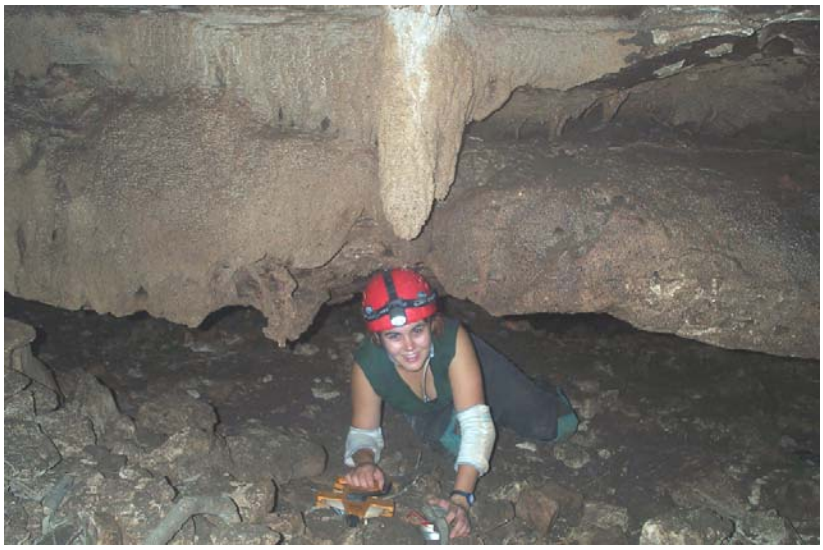
History

Hackberry Hole was first reported on an environmental survey of the Ira Yates Property by Mike Warton and Associates in 1993. However, they thought the cave they had found was Calypso Cave, and did not realize they had found a previously unknown cave. Hackberry Hole was rediscovered on a karst survey by the City of Austin in 2005, given the obvious name Hackberry Hole and briefly explored by Bill Russell at that time.

The cave did not appear promising as there was no airflow, but it did need a map. Bill Russell and Saj Pierson visited the cave on September 27, 2006 and mapped the main room, and Bill returned with Guin McDavid on October 3rd and mapped the west end and the south alcove.



Hackberry Hole-entrance and interior



Dunvegan Dungeon

Dunvegan Dungeon is entered through a narrow fissure that had to be enlarged to provide entrance. This fissure drops 15 feet into the first room of the cave. The drop would be difficult to climb, but there is a rickety ladder to aid decent. A few feet from the ladder a large breakdown block has trapped debris and sediment, and the other side of the block drops six feet into the Second Room. In the other direction the floor slopes up to a small hole to the surface that provides raccoon access.

The Second Room is spacious chamber 30 feet long, 20 feet wide, and ten feet high, with a ridge of large fallen blocks along the northwest side. Much of the floor of the room is a flat area of washed in black surface soil. The ceiling is composed of a tilted block of massive limestone. At the far end of the room a passage extends around a collapse from the surface to end in a small hole with some air. The main source of air is from a low opening in the center of the northwest wall, behind the blocks of breakdown. This opening had to be enlarged to make it passable.

This low squeeze opens into a wide low area that forms one end of the Third Room. The Third Room is 30 feet long, twenty feet wide, but mostly low, only in the center can a person stand. The room ends in massive breakdown to the north and east, and so far the only way on is a small passage to the southwest that has air flow. To enter this passage it is necessary to squeeze down under a natural bridge, and then up to the passage level. The passage soon reduces to a low squeeze over a clay floor. After 35 feet the passage opens into the Fourth Room, 20 feet long 15 feet wide and six feet high at the center. At the far end of this room a dig following the airflow though loose rocks partly cemented together by flowstone progressed about four feet without finding evidence of an opening large enough to follow.

History

The cave was first located in 1995 by Craig Turner, who removed rocks from the entrance fissure and found that the fissure continued on down into what appeared to be a large room, but a narrow constriction and several large boulders prevented access. On the weekend of 23 September 1995, Craig was looking for a reported cave in the Goat Cave Karst Park off Deer (Davis) Lane, and found a UT Grotto training session at Goat Cave. He asked them to check out the fissure behind his house. They drove over and attempted to remove the rocks, but they were too big, and so Terry Holsinger called Bill Russell, since Terry was out of Kinepak. On Saturday of the next weekend, Craig Turner, Nico Hauwert, Bill Russell, Vico Jones, Terry Holsinger, Michael Madewell, Sara Dierk, and several others, dug in the fissure, removing the boulders and widening the constriction. Sara scooted down to report a room at the bottom of the fissure and then a larger lower room. The others followed and explored the two rooms but there were no obvious leads.

On Sunday, Craig Turner, Bill Russell, Bianca (Ellis) DeLeon, and Julie Jenkins returned to clean loose rocks from the entrance area and to find the source of the airflow. After much searching, two blowing holes behind the breakdown were located. These holes were difficult to find, as they were not located along any joint trend or obvious structural feature, but were along the wall in the center of the main room. Several hours were spent enlarging the lower hole, following a strong airflow. At the end of the dig, what appeared to be a low room could be seen ahead, and despite frantic efforts by Julie and Bianca to finish the dig it was obvious we would have to return. Craig Turner was impressed. After watching Julie and Bianca dig Craig said, "They are like animals." Two weeks later, Bill and Bianca returned with Craig Turner and dug the rest of the way into the room. Craig had looked through the small hole at the end of the dig the week before and seen a large room, but alas, reality is cruel. The "room" proved to be of standing height only in a few places; low, wide openings extend in several directions over clay-covered breakdown.

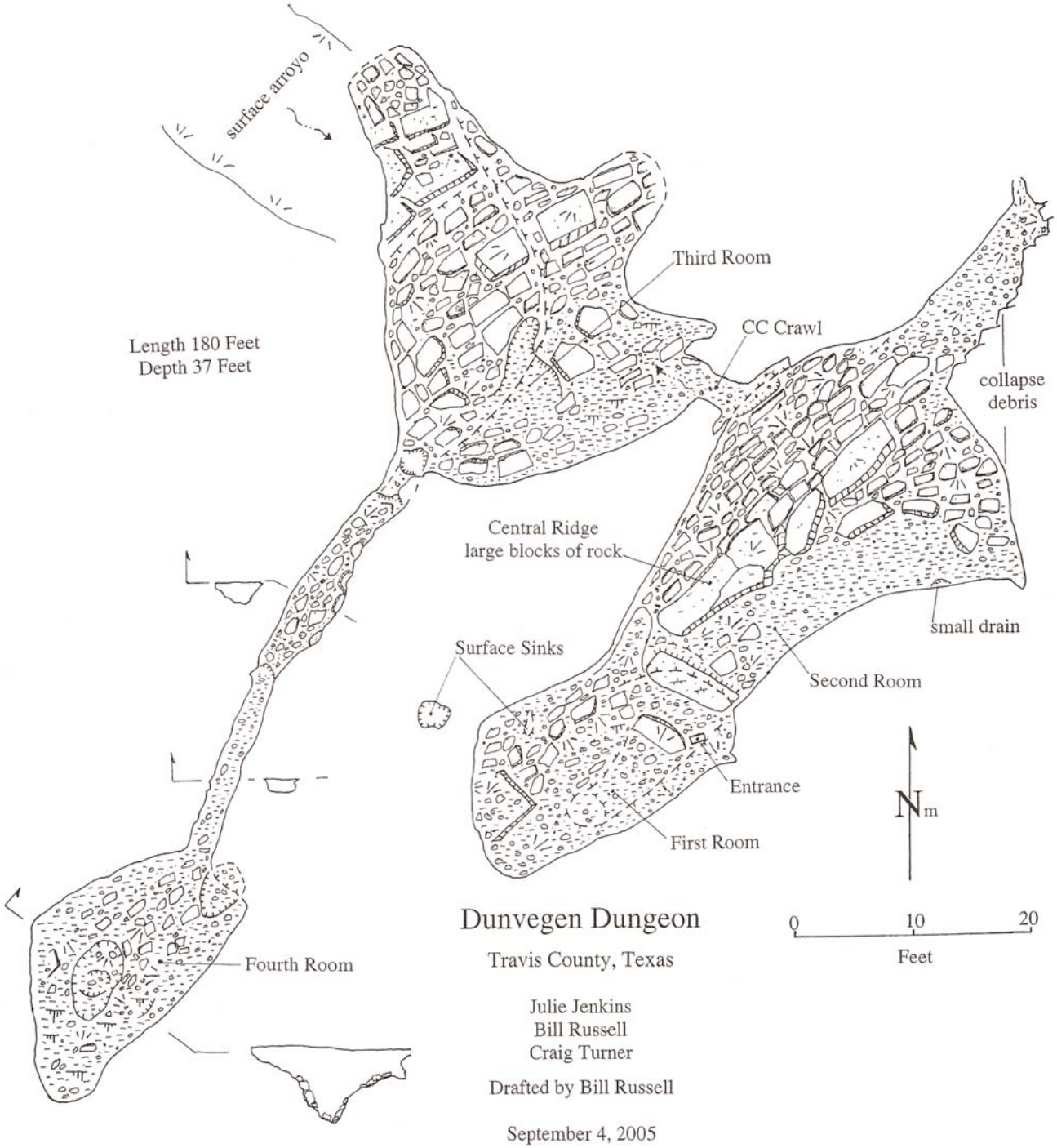
The airflow came from a mostly breakdown-filled passage, which could be followed by squeezing over and between muddy breakdown for about 20 feet. The passage continued as a low squeeze, but several small rocks had to be moved, so a return trip was planed. On a return trip in April1996, Craig Turner and Nico Hauwert dug along the passage to a fourth room, actually more of a passage enlargement where the floor sloped down into a funnel-shaped depression. Several holes appeared to continue, but much of the breakdown surrounding the openings was unstable, and digging was postponed. In September of 2006 Bill Russell, Guin McDavid, Matt Zappitello, and Tone Garot crawled into the Fourth Room to dig at the end of the cave. About four feet of rock was removed, to where it was possible to see ahead four feet though small openings. There was no obvious passage; and the dig was abandoned.

After the cave was discovered Craig Turner built a gate over the entrance by cementing over the narrow entrance crack leaving a 1.5 by 2 foot hole that he sealed with boards screwed down to the wood frame, but children found the cave and removed the cover, and currently the cave is not gated. Nico Hauwert made a rough map of the cave on March 9th 2001, and Bill Russell and Julie Jenkins returned with Craig Turner and made a more detailed map on September 9th 2005.

The cave is named after Dunvegan Castle, an English castle that influenced Craig Turner so much that the first of his backyard fantasy buildings was a castle-like gazebo, Dunvegan Keep. The cave would logically be the Dunvegan Dungeon.

Geology

The entrance to the cave is in the Grainstone Member of the Edwards Limestone, but the rooms of the cave are developed in the underlying Kirschberg Member. As in many other areas along the edge of the Grainstone outcrop, there has been considerable slumping of large blocks of the more massive Grainstone into voids produced by solution in the Kirschberg. Craig Turner reports that after large rain events much surface water enters the cave through numerous small openings. There is considerable flow loss from Bear Creek into the Kirschberg in the vicinity of the cave, so if the airflow in the cave can be followed there is an increased possibility of more cave.



Dunvegen Dungeon

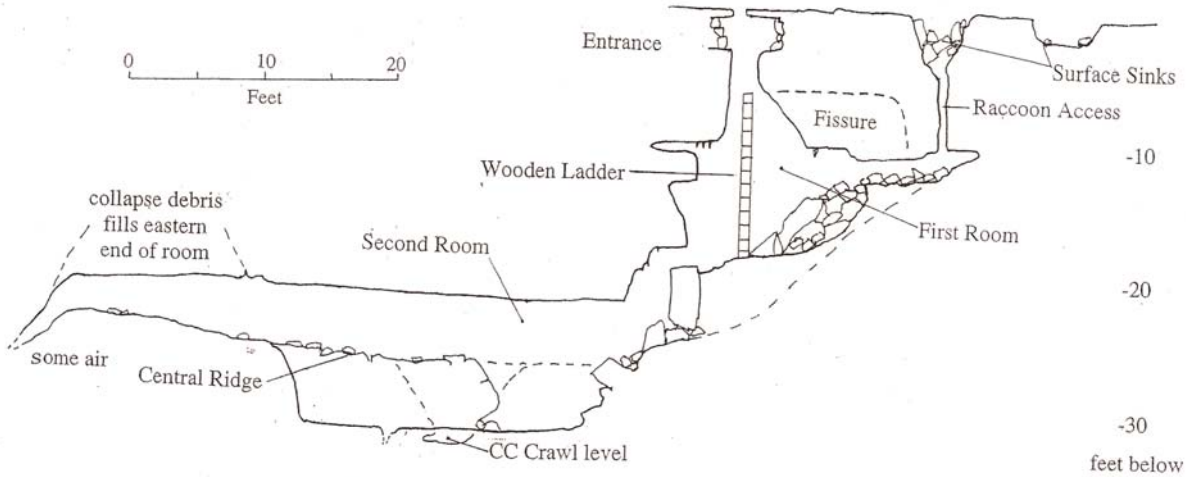
Travis County, Texas

Julie Jenkins
Bill Russell
Craig Turner

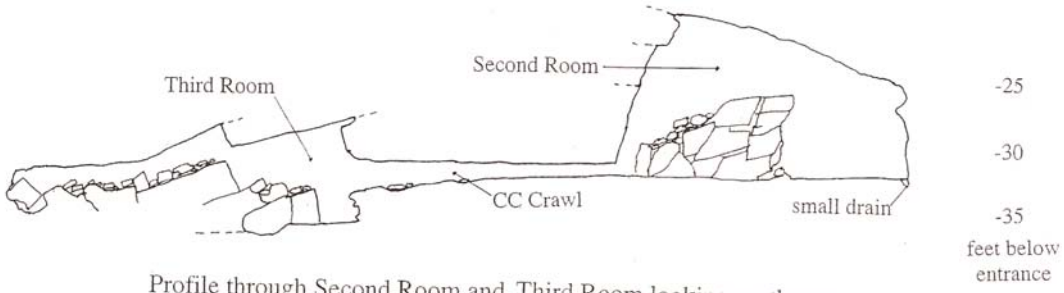
Drafted by Bill Russell

September 4, 2005

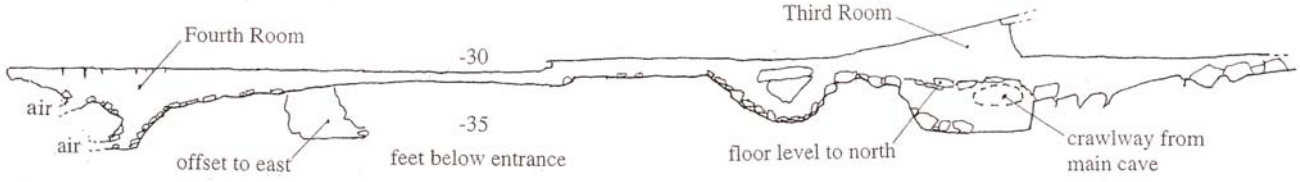
Texas Cave Management Association



Profile through First Room and Second Room looking southeast



Profile through Second Room and Third Room looking northeast



Profile through Third Room and Fourth Room looking northwest

Dunvegen Dungeon Profiles

Bill Russell, Julie Jenkins, Craig Turner

September 4, 2005

Dunvegen Dungeon

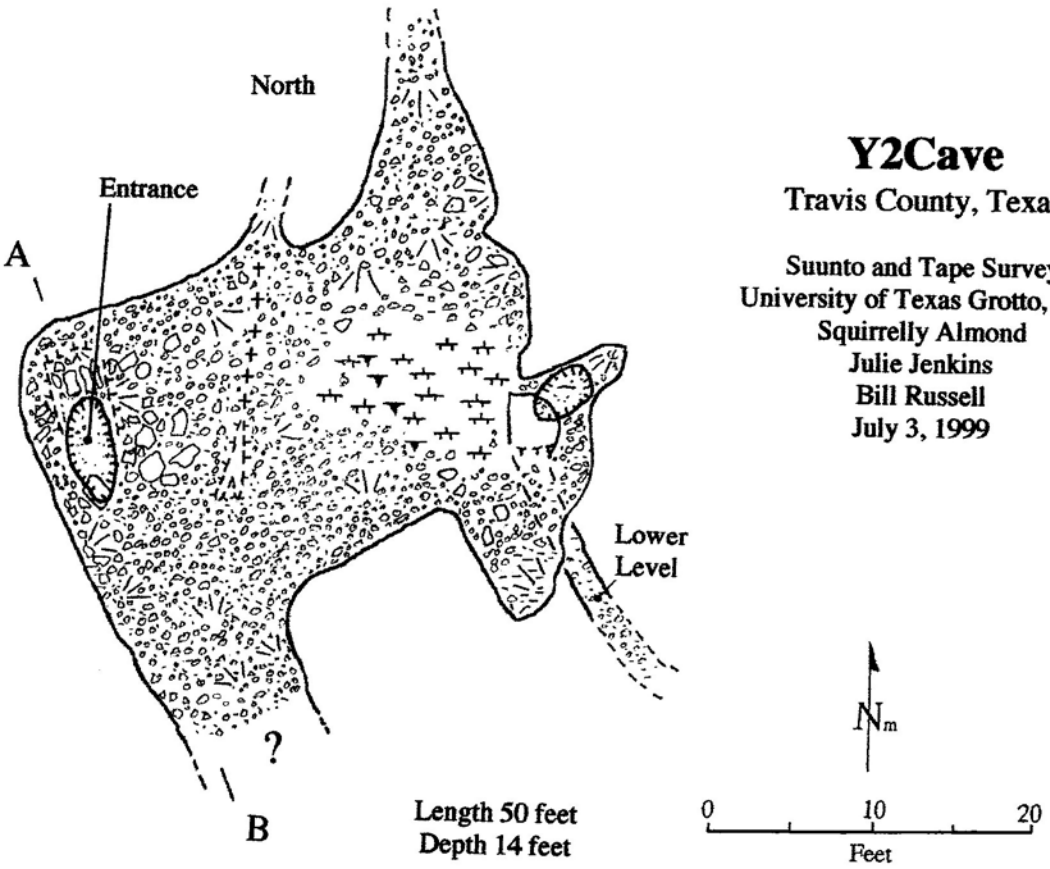
Y2Kave

As the name suggests Y2Kave is a relatively recent discovery. As close as can be reconstructed one of Mike Warton's old karst surveyors had moved into a new subdivision and one day in early 1999 he took his dog for a walk in the woods and noticed a rock filled solution hole in the bottom of a small depression. He contacted Charlie Savvas and they began clearing rocks from the suspected cave entrance, and about six feet down they broke into a low room about 30 by 20 feet, but only about three feet high at the center. Parts of the room extended to the north and south as low openings only a few inches high, but an indistinct drainage channel lead them across the room to a small hole in the far corner with airflow. Using rock shaving they enlarged this hole until they could squeeze down into a constricted crawlway that extended to the south. This passage was promising, but soon was blocked by clay fill. They laboriously began clearing the lower crawlway and carrying all the tailings up into the main room.

Then on another walk Warton's old employee noticed coats and jackets left by cavers exploring Blowing Sink Cave, so he left them a note about the new cave he had found. When Bill Russell and Julie Jenkins returned to the surface they found the note and checked out the new find. The cave was a good discovery, and the airflow indicated more cave might be present. The entrance received drainage from an area that extended at least 100 feet upslope to the north. This drainage crosses the main room of the cave, and flows into the lower crawlway. The crawlway is small but all that blocks progress is a clay fill, and about ten feet ahead down the narrow tube an enlargement, or at least a change, is visible. Other digs at the time were more pressing, but the cave was worth saving, and the city environmental offices were notified of the find and the cave was mapped by Julie Jenkins, Bill Russell and Squirrelly Almond on July 3, 1999.

The site plan for the subdivision was under review, and even though the sinkhole had been noted on the several-year-old environmental impact statement for the development, no set back had been required. The city said that even though the old plan had been approved the developer should not build over the cave, and to everyone's surprise the Texas Natural Resources Conservation Commission agreed. This could be an important precedent requiring that new information be considered when a developer is using an old environmental survey. So now there is a gap in the rows of houses and a relatively undisturbed cave, sinkhole and a stand of trees.

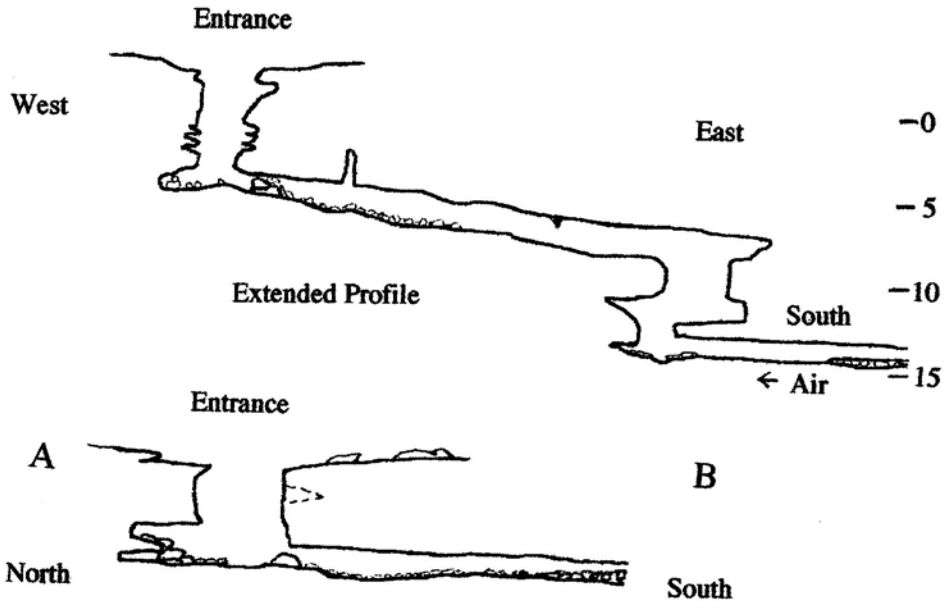
The cave was discovered at the height of the doomsday speculation about the new millennium, hence the name. The cave entrance was covered with a grate that was held in place by small nuts on threaded rods. When visited in 2006 a large metal bar had replaced the small threaded rods. Large bolts, bent over to prevent their removal, held the grate to the bar, and the bar was securely anchored at each end. There is no provision for entering the cave.



Y2Cave

Travis County, Texas

Suunto and Tape Survey
University of Texas Grotto, NSS
Squirrelly Almond
Julie Jenkins
Bill Russell
July 3, 1999



Y2Kave Photos

Entrance to Y2Kave. The bar and bent bolts prevent access to the cave.

Brief Descriptions

This section should follow the Introduction, Geology, Biology and Major Cave Descriptions and act as an index. The larger caves with more detailed descriptions (**Bold Face**) are cross-referenced in this section, and the table of contents will also provide the page numbers of the major cave descriptions. Complete reports for all caves could be on an enclosed CD.

Airman's Cave (11,300'L, 30'D) The longest cave in the county. A mostly abandoned overflow route for Barton Springs, the cave opens on Barton Creek. Most of the cave is a crawlway with only a few rooms. Strong airflow though the cave indicates there is more cave to be discovered. For more details and a map see pages 45 to 50. Area 9

Airman's Cave Annex (20'L, 3'D) Small cave a few feet downstream and at the same level as the entrance to Airman's Cave. Likely at one time part of Airman's Cave, but the connection is filled. Area 9

Another Cave (47'L, 20'D) A small sink in a park near MoPac leads to a room 25 feet long, 20 feet wide and up to 6 feet high with airflow. Area 8

Backdoor Cave (60'L, 15'D) Cave by a spring on Barton Creek downstream from Sculpture Falls. Entrance leads to upper and lower crawlways that join. Area 7

Backdoor Spring- Small spring downstream from Sculpture Falls that flows into Barton Creek by Backdoor Cave. The flow from Backdoor Spring maintains a permanent pool in Barton Creek. Area 7

Barker Ranch Cave No. 1- (115' L, 34' D.) This cave is entered through a circular sink 15 feet in diameter and ten feet deep with a large hackberry tree growing from the sink that provides a way to climb down into the cave. A room 30 feet in diameter and up to ten feet high opens at the bottom of the sink. At the back of the room a small squeeze leads down to a passage through breakdown that ends in a low area with air flow. Area 6

Barker Ranch Cave No. 2 - (117' D, 23' L) This cave is entered through a shallow sink in a grove of oaks. The entrance opens into a passage 15 feet wide and four feet high that leads 30 feet to the right and 10 feet to the left to a climb down into a lower area that extends for 30 feet. Area 6.

Barker Cricket Cave - (20' L, 8' D.) This cave is 16 feet long and 6 feet deep. The narrow entrance slot opens into a room three feet high and ten feet in diameter. Area 6

Barton Creek Cave No. 1- (100'L, 4'D) The downstream most cave on the Urban Assault Wall, a cliff above Barton Creek, The cave is a crawlway about 100 feet long, about 30 feet above creek level. Area 9

Barton Creek Cave No 2 - (75'L. 3'D) This cave is just upstream from Barton Creek Cave No. 1 on Urban Assault Wall, 30 feet above creek level. The cave is a crawlway about 75 feet long. Area 9

Barton Creek Cave No. 3 - (109'L, 3'D) Just upstream from Barton Creek Cave No. 2 on the Urban Assault Wall above Barton Creek. A crawlway 109 feet long, thirty feet above creek level, under an overhang. Area 9

Blowing Fern Cave - (101'L, 33'D) This cave is entered trough a fissure ten feet long, three feet wide and six feet deep. A low opening leads to a room about two feet high, 10 feet wide and 30 feet long. At the end of this room a squeeze leads to a blind eight foot pit, and another squeeze leads to a crawlway blocked by flowstone and formations. High levels of carbon dioxide have been measured in this cave. Area 6

Blowing Sink Cave (1655'L, 254'D) The deepest cave in the county and one of the longest. A crawlway leads to a series of drops into a passage with a flowing stream inhabited by aquatic salamanders. From the stream passage a chimney leads to more cave. For details and map see pages 56-59. Area 5

Bullet Cave (100'L, 8'D) The entrance to this cave is on a cliff above Barton Creek upstream from Airman's Cave. A 30-foot crawlway to small room, then to an end in massive collapse. Area 9

Dunvegen Dungeon (180'L, 37'D) A fissure in the woods drops into a 20 foot long entrance room, this room opens into a 30 by 20 foot room about 10 feet high. A squeeze leads to a low ceiling room and from this room a low passage with air flow leads to a small room where the cave is blocked by small breakdown. Area 10

Hackberry Hole (60'L, 15'D) Shallow entrance in one side small dirt floored room with large hackberry tree. One end of the four-foot high room slopes down to a side alcove. Area 7

Whirlpool Cave (1440'L, 52'D) This frequently visited cave is almost under Mopac Expressway in south Austin. A slope down over breakdown leads to a horizontal crawlway that extends to a low wide room about 100 feet long, 40 feet wide and up to eight feet high. Passages from this room extend east and south, the south ending in a breakdown complex and two rooms. For more details and map see pages 67-72. Area 4

Y2Kave (50'L, 14'D) This cave is located in a small preserve. A sink drops six feet into a room 30 by 20 feet, and 3 feet high at the center. A crawl with airflow might lead to more cave if enlarged. Area 8