Cascade Caver

Published by the Cascade Grotto of the NSS

May 2007, Volume 46, No. 5

Cascade Caver

ISSN 0008-7211

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MEETINGS

Regular grotto meetings are held monthly at 7:00 pm on the third Friday of each month at the Shoreline Community Center in the Hamlin room. The Community Center is at 18560 1st Ave NE in Shoreline. Please see the back cover for directions.

UPCOMING EVENTS

8/16/07 Twin Falls Rappel
8/18/07-8/19/07 Danger Cave, etc.
9/15/07-9/16/07 Lookout, etc.
10/13/07-10/14/07 Cascade
11/03/07-11/04/07 Cascade

COVER

This painting of Three Mile Creek Cave is by Rose Garnick and was sold at the NSS Auction in 2005 to Nikki and Michael McCormack (Thanks Rose!).

The Science Issue
Mayish 2007
By Michael McCormack

Welcome to the new annual science issue of the Cascade Grotto's Caver! It's my personal goal to get at least one issue with a somewhat scientific bent out every year. These require a little more effort on the part of those who create the articles, so I would like to thank our guest contributor Michelle Harris. This article was written for her undergraduate soil studies class at Western Washington University. Michelle contacted the grotto for assistance with her studies. While we all tried hard, we ended up only getting together a single trip to the cave. From that trip came her soil study of Jackman Creek cave.

This is not a peer reviewed journal, so please don't expect rigorous scientific methods, or professional jargon. It is only intended to be readable and enlightening, but not a peer reviewed pub.

Finally though I'm certain Ms. Harris had provided her references, for the life of me I can't find them now, so we'll have to live without them. Thanks to Tom for his thorough review of the material. Since Michelle is no longer in the area, many of his questions and comments must go unanswered, but I appreciated them nonetheless.

Additionally in this issue, we have a geological study of Three Mile Creek cave provided by Tom and a guest columnist for our regular column Not Just Knots.

I sincerely hope that you enjoy this issue and look forward to next months, it will be out before you know it (yes I'm behind again and I know it…)

-ed.

Origin and Composition of Sediment on the Floors of Caves in Western Washington
August 16, 2006
By Michelle Harris

Abstract

Jackman Creek Cave located in Concrete, Washington is part of the Chilliwack Formation, which extends throughout northwest Washington and southern BC. The marble cave is lined with ground sediment that has an unknown origin. Hypotheses about the origin include transportation by wind or groundwater into the cave or deposition as a result of the decomposition of the marble walls. XRD and grain size analysis showed the ground sediment samples were quartz grains with a 0.7 mm average grain size. Microscopic analysis of the cave wall showed a deformed calcite composition, unlike the ground sediment collected. The quartz floor sediment can most likely be explained by deterioration of the cave ceiling or groundwater over-saturation and fluid movement.

Introduction

When exploring a cave in Western Washington, you'll discover pristine marble walls, beautifully formed decorations, and a whole lot of dirt. The origin of this dirt (sediment) is unknown to most, including the local cavers and seems to differ from cave to cave. Studying these sediments can tell us if they have an endogenetic origin (internal processes) or exogenic origin (external source) and lead us to a better understanding of a particular cave's past.

Caves are highly efficient sediment traps where accumulation exceeds erosion and sediments are preserved (Sherwood and Goldberg, 2001). The Chilliwack Formation, which extends throughout northwest Washington and southern BC, contains groups of limestone and marble pods that have yielded numerous small caves throughout the area. Jackman Creek Cave located in Concrete, Washington (Figure 1) has an overall ground sediment that lines the cave floor. Hypotheses about the origin include transportation by wind or groundwater into the cave or deposition as a result of the decomposition of the limestone walls.

Cave sediment's composition and sorting are greatly controlled by bedrock lithology, elevation, aspect, relation to local drainage, and human activity (Ford and Cullingford, 1976) Microscopic observations, lithological descriptions, and sediment size classifications of cave floor sediments provide a general understanding of sediment origin, composition, transport agents, and the nature of the depositional environment.

Past cave sediment studies have used many scientific techniques to understand a particular cave's sedimentology. Details of field and laboratory methods used to interpret and analyze cave sediments can be found in Farrand (2001). Weiner and others (2001) performed a detailed three-dimensional analysis of the major minerals in a cave in Israel and found three main assemblages. These were identified as a calcite-dahllite assemblage, a mainly silicate assemblage, and a highly altered sediment assemblage containing broken down clay particles (Weiner and others, 2001). Other studies have found mainly clays in cave ground sediments and classified the sediment based on origin. Polyak and Guven (2000) categorized clay sediments from caves in New Mexico as being either detrital or inherited from the weathering of limestone. Although different studies focused on different aspects of the analyses of cave sedimentology, they all used similar methods to conduct their studies. This framework will be adopted for the current study.

<u>Methods</u>

Jackman Creek Cave is located outside of Concrete, Washington near the Skagit River (Figure 1), Federal Regulations discourage the release of the exact location. A sediment sample weighing approximately 100g was collected from the floor of the cave along a limestone wall and near the middle of the caves length. The sample was collected by putting a sandwich bag over my hand and grabbing a handful of dirt in a place where we had yet to trample through the sediment. The sample contained many gravel sized pieces of rock along with a lot of sand sized sediments. A small rock sample from the cave wall was also collected to compare to the sediment in grain size and composition.

The sediment sample was dried and sieved using whole number phi screens from -3 to +3. The screens were mounted into the Ro-Tap siever for 20 minutes. Screens were emptied onto paper and samples weighed individually. A cumulative curve histogram shows the size fraction having the highest frequency as well as the median grain size (Figure 2). Because the sample had such a large grain size distribution, the sediment that was greater then three Phi was put into the Mastersizer 2000 to measure the particle size distribution of the finer then fine-sand sediment (Figure 3). X-Ray diffraction was performed on some of the ground-up sediment (Figure 4), and a thin section was made from the collected rock slab (Figure 5).

<u>Results</u>

Dunham's classification was used to identify the carbonate rock collected from the cave site. Because the rock has no recognizable depositional features and effervesces readily in HCl it is crystalline calcite.

Sieving analysis resulted in a cumulative curve showing a fairly even distribution in grain sizes ranging from < -2.0 Phi to >3.0 Phi, with the median being at .70 mm or .5 Phi (coarse sand) on the Wentworth scale (Figure 2). Particle size distribution in the Mastersizer 2000 showed the volume percent of grains to be between 0.020-2000.000 μm, which corresponds to a range of clay to very course sand grains on the Wentworth scale, with the curve peak being at 211 μm or fine sand size (Figure 3).

X-ray diffraction yielded one main reflection pattern and two small ones (Figure 4). The largest reflection peak matches quartz (Q), while the two small reflection peaks match feldspar (F) and a small amount of clay or mica (M) (Figure 4).

Thin section analysis of the rock slab showed a high percentage of calcite grains and a few quartz grains (Figure 5). The calcite grains showed ductile deformation and kinking suggesting metamorphism took place.

Discussion

Field and laboratory analysis of the Jackman Creek cave floor deposits determined composition sediment with the most common sizes being coarse grained sand and fine grained sand, with a wide distribution of grain sizes in-between. Considering the calcite composition of the cave walls, a strongly silicate composition of the find sand was unexpected. Sherwood (2001) found that as carbonate rocks weather, the insoluble fractions vary according to bedrock composition, but generally consist of various silicate and siliceous minerals, crystalline quartz, and heavy minerals. Heavy minerals were not found in the cave sediment, but breakdown of carbonate could be the explanation for the quartz composition.

A polymodal frequency histogram is explained by simultaneous inputs from two or more sources which is characteristic of a cave passageway (Farrnad, 2001). The frequency modes usually reflect more than one source but that typically a very coarse mode reflects breakdown of the cave ceiling whereas a fine sand mode reflects groundwater or wind deposits.

The high volume percent of fine grained sand could be explained by ground water or wind processes, but grain size sorting should be present (Boggs, 2001). Sherwood (2001) explains that wind or water deposits in caves can vary from cobble to clay size and often appear as highly variable interbedded strata that result from annual fluctuations of groundwater levels and wind speeds. These water/wind-transported sediments can appear anywhere in the cave and be moved through small fissures or through a large open channel. Considering most places in western Washington are oversaturated with ground water in the winter months, the wide distribution in grain size is most likely a result of annual groundwater fluctuations.

The rock slab analysis showed the composition of the cave was mainly calcite with a little quartz, and the XRD of the sediment showed no peaks matching calcite. The quartz present in the thin section cannot account for the entire composition of the ground sediment, and therefore suggests the ground sediment is exogenic.

Both the XRD and thin section analysis yielded fairly accurate results giving a high confidence level with the findings. The thin section contained only two grain types allowing easy identification, while the XRD gave almost matching peaks with the quartz mineral. SEM analysis on the quartz grains could give a better interpretation of the sediments origin. The microstructure of the surface of the quartz sand grains could reveal how far they were transported, since quartz grains are generally smooth and lack fractures (Boggs, 2001). If the grains were found to be immature, they would most likely be endogenetic, whereas if they were fractured and mature they would most likely be exogenic.

Conclusions

Nearly all cave deposits are found to be complicated sequences derived from multiple sources and numerous processes, with no two caves having the same sequence regardless of the source area. Description and classification of sediments provides an understanding of their source and transport agents, although doesn't guarantee a definite reconstruction of a cave's past. Microscopic observations, lithologial descriptions, and sediment size classifications of ground sediment in the Jackman Creek cave in Western Washington have yielded a mainly quartz sediment that ranges in grain size from pebble to fine-grained silt. The two most frequent sediment sizes are coarse sand, which are most likely from the deterioration of the cave ceiling, and fine grained sands, which are most likely from groundwater over-saturation and fluid movement.

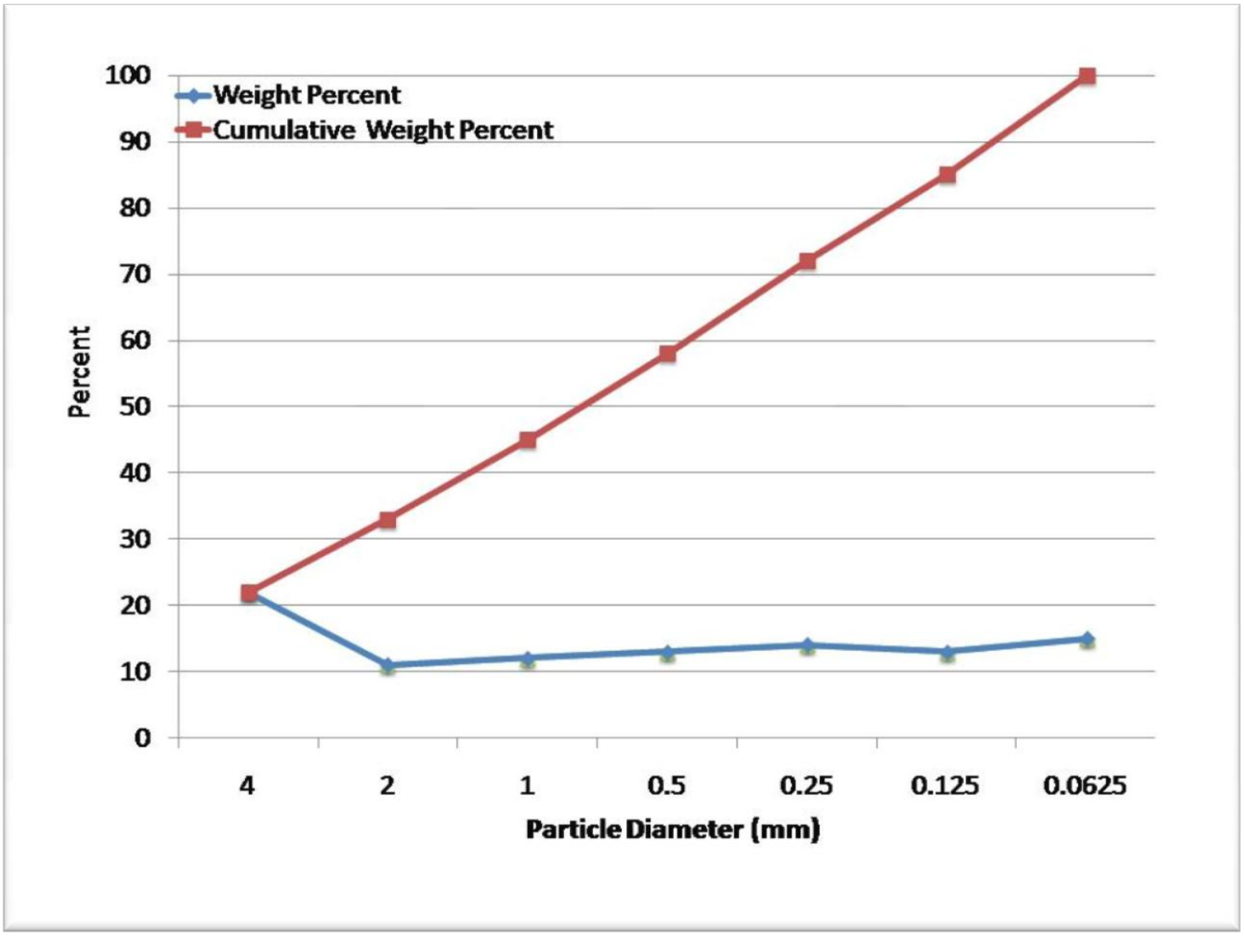


Figure 2: Cumulative Curve Particle Size Distribution

Dave Decker works his way through Jackman Creek trying not to get wet.

Dave Decker and Michael McCormack guided Michelle Harris through Jackman Creek to collect the samples for this study.

Photo by Michael McCormack

Result Analysis Report

Sample Name:
jackman creek

Sample Source & type:

SOP Name:
Fraunhofer manual

Measured by:
michelle

Measured:
Monday, February 06, 2006 5:27:42 PM

Analysed:
Monday, February 06, 2006 5:28:06 PM

Particle Name:
Fraunhofer

Particle RI:
0.000

Dispersant Name:
Water

Accessory Name:
Hydro 2000G (A)

Absorption:
0

Dispersant RI:
1.330

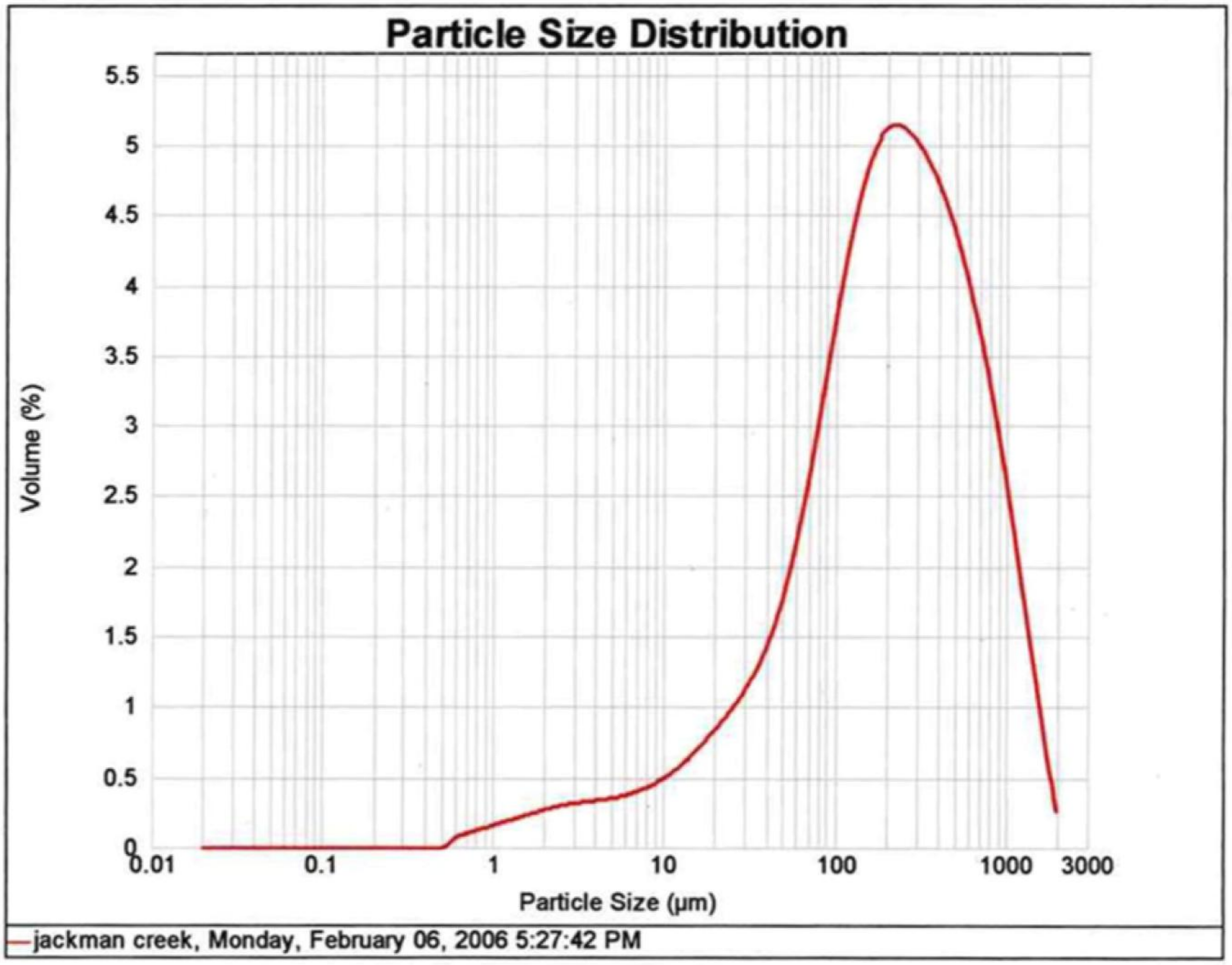
Analysis model:
General purpose

Size range:
0.020 to 2000.000 um

Sensitivity:
Enhanced

Obscuration:
17.91 %

d(0.1): 27.616 um **d(0.5):** 211.208 um **d(0.9):** 818.113 um



Size (µm)	Volume In %
0.010	
	2.70
3.900	
	4.10
15.600	

Size (µm)	Volume In %
15.600	
	11.40
62.500	
	37.46
250.000	

Size (µm)	Volume In %
250.000	
	21.92
500.000	
	22.42
2000.000	

Size (µm)	Volume In %
2000.000	

Size (µm)	Volume In %

Size (µm)	Volume In %

Figure 3: Mastersizer Particle Size Distribution Graph

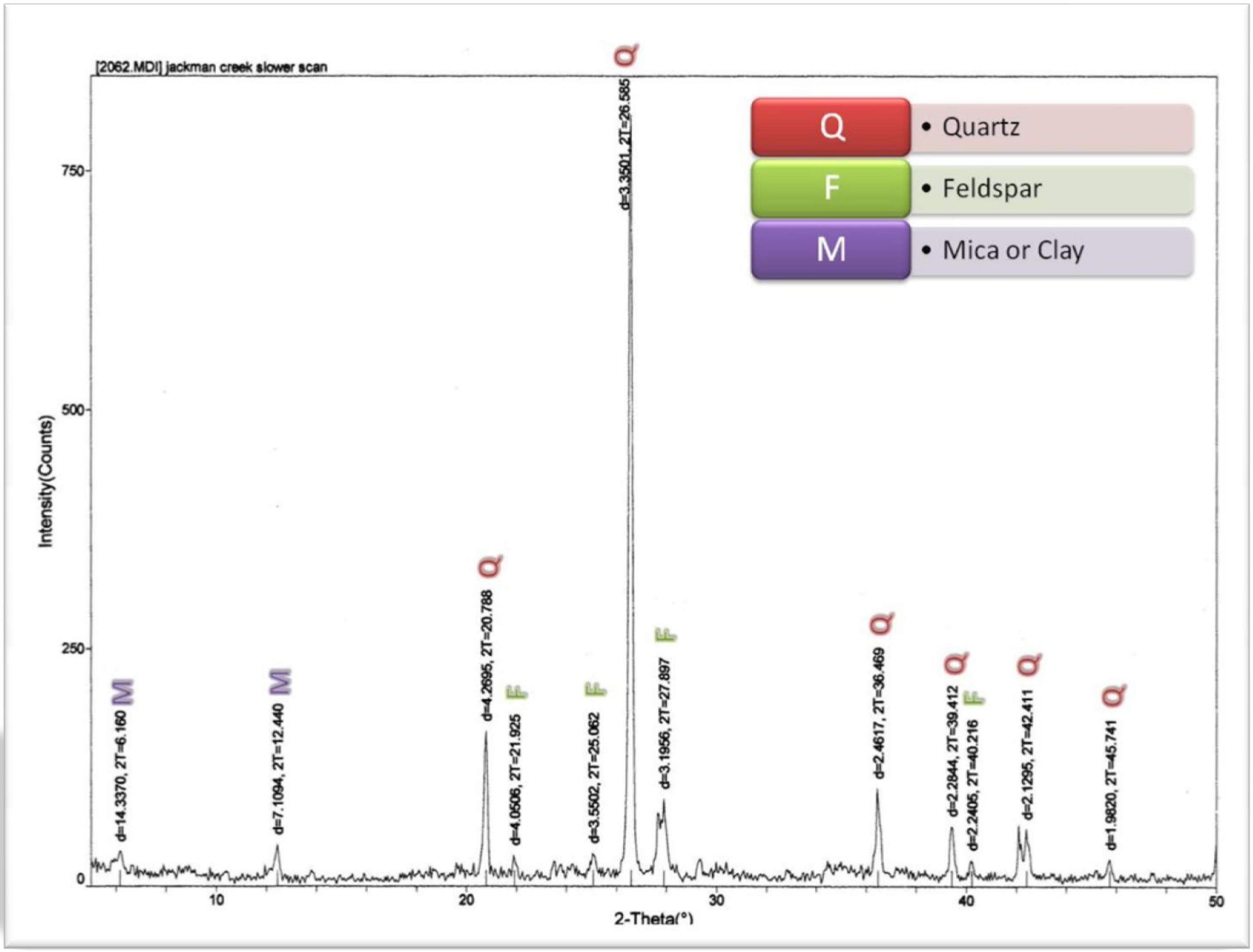


Figure 4: X-Ray Diffraction showing the concentrations of Quartz, Feldspar and Mica/Clay.

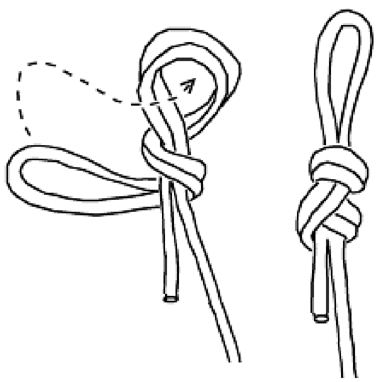
Not Just Knots
August 16, 2006
By Guest Columnist Jansen Cardy

The Figure 9 Knot – Mysteries and Myths

I was interested to read the "Not Just Knots" column by Tom Evans in the April issue of the Caver. I think starting up this column is an excellent idea, helping open the mind to different vertical caving techniques and options. Good job!

In this spirit, I would like to add a few comments about the Figure 9 knot featured in the last issue. First and foremost, one should understand there is more to a knot than arbitrary static breaking strength percentages. There is that certain 'caver practicality' aspect to take into account, such as the amount of rope and time needed to tie (as Tom mentioned) and whether the finished product is more easily learned and recognized by the average caver and his/her companions. It's true there are situations when using the Figure 9 may be preferred, but to generalize by saying it's 20% stronger and therefore safer can be misleading on both counts. If you don't mind me getting technical for a moment, here's why.

In slow pull tests conducted in 2001 by Lyon Equipment (UK), modern low-stretch kernmantel rope tied with the Figure 9 loop knot retained an average of 10% (not 20%) more of its minimum breaking strength (MBS) than when tied with the Figure 8. However... the Figure 9 was also the least consistent performer of all the knots they tested. The MBS varied as much as 20%, using 4 different manufacturers' ropes which were all new, dry, and of similar diameter (10.5 and 11mm). Sudden drop tests by other facilities in the UK proved even less conclusive. Tests were conducted with a Figure 9 at one end of the rope and a Figure 8 at the other, and it was anybody's guess which would break first. The results varied so much that neither knot could reliably be predicted as more or less likely to fail in this event.



But don't dismiss using the old Figure 9 completely, because it's still acknowledged as an advantage in certain applications. For example it's popular for tying loops in thin cord, like the Spectra footloops of my Frog system. The properties of this small diameter very-static Spectra cord suit a slightly bulkier knot like the Figure 9, especially if you ever need to untie it again. The same can apply for those who like to cave ultra-light, using 8 or 9mm rope instead of 10 or 11mm. But apart from that, there seems to be little practical advantage in favoring a knot with slightly wider turns and more internal friction – at least as a general end-of-rope loop knot for most caving uses. I'm not saying the Figure 9 is a poor choice compared with the Figure 8, just that the issue is not as clear cut as some people have been led to believe.

As a final note, please be careful not to succumb too easily to the 'old wisdom' of knot strength percentages. Unfortunately some reputable publications still tote test results from 25 years ago or more, even in their latest editions. What's the problem with that, you ask? Well, most cavers and climbers are not using the same rope we were 25 years ago. This new stuff tends to be more forgiving of use and abuse, including the strength reduction caused by the tight bend radius of a knot. The methodology of testing failure modes has also evolved, with more emphasis on the results of sudden impact on low stretch rope. You could even say knotted ropes are on-average a little stronger now than before, and the moderate difference in strength between various climbing knots is considered slightly less critical than it once was.

References

Results of some relatively recent testing of knots, including the Figure 8 and 9 – Lyon Equipment (UK) investigation into items of PPE, 2001, chapter on knots http://www.brant.se/html/bilder/testar/15.pdf

By comparison, here's an example of a recent publication with snippets of outdated information – Vertical, online edition, 2001, chapter on knots

http://www.caves.com/3KNOTS.pdf

Addendum: The 2007 version of Alan Warild's online publication "Vertical" has just been released, and can be found at www.caves.com/vertical. Please note the knot strength information has been updated, and now incorporates more recent testing results as well as the older material. The category "non-recommended knots" has been dropped, and the title "other rigging knots" has appeared in its place. Although the old figures are still included, I think it's encouraging to see changes have been made.

Three Mile Creek Cave Geology
May 16, 2007
By Thomas Evans

Introduction

Each caver caves for different reasons, and some of us become quite attached to certain caves, activities in caves, or techniques. A cave that has become the object of interest of one caver is Three Mile Creek Cave. Late last year I was asked to journey to Three Mile to assess the geologic setting in and around the cave. In the recent historical past the area around the cave has been logged which has, presumably, increased the sedimentation within the cave. There is an interest in restoring the cave through digging it out, and I was asked to look in the geologic feasibility of this activity and its potential for long term success.

Geologic Setting

Three Mile Cave is a karstic cave dissolved out of limestone. The entrance is in a steep slope with a large opening that constricts as you move further into the cave. The floor is a packed mudstone with layers of gravel interbedded throughout. The floor slants upward to a sinkhole entrance to the cave at the back. This entrance is not open since the material coming in blocks it. Above the cave the land has been clear cut and is devoid of most large plants. The soil is a fine grained red/brown clay size, very rich, and a few feet thick. This material is very loose, not compacted or indurated, and without the strengthening of plant roots, it readily disaggregates and deforms. The upper entrance of the cave has a sink hole with a classic funnel shape formed largely from this red clay soil. It is a deep sink hole, between eight and ten feet tall, partially choked with vegetation.

Interpretation

Three Mile Cave is a local depocenter, and will stay that way as long as there is accommodation space within the cave. Material on the slope above the cave will continue to move downward until it reaches the lowest place it can. The soil above the cave slips into the sinkhole and will be deposited inside when the water in the sediment is no longer enough to lubricate the grains enough to slip down the available slope. This process will continue until the cave is in soil transport equilibrium with the surrounding landscape; essentially when full of soil.

The cave filling process started as soon as the sinkhole entrance to the cave developed and progressed only as fast as the supply of soil would allow. In a dense northwest forest soil is not transported rapidly down slope due to the cohesive effects of plant roots. Unfortunately with the advent of logging on the hillside, the roots holding the soil in place have been removed causing a greatly enhanced down slope movement of soil. This increased rate of sediment filling will rapidly (geologically speaking) fill the cave if unchecked.

Discussion and Conclusions

The forces working in and around Three Mile Creek Cave are relatively small, and work through little cumulative effects over time. However it will fill with sediment if no action is taken to preserve the cave. This raises some serious cave conservation concerns as the required work is Herculean in scale since to preserve the cave requires an attempt to control natural processes. Humankind has never been able to adequately manipulate nature in a sustainable manner, and cave conservation is no exception. The actions we, as cavers, take to preserve this cave, could degrade it as well, yet if we do not take action the cave will certainly be lost over time.

Two things must be done to preserve the long term survival of the cave. First, the existing sediment within the cave that has built up over time should be removed. This would require a great amount of heavy labor, time, and logistics. Secondly, steps should be taken to prevent further sedimentation. Planting of trees upslope of the cave would greatly reduce the supply of sediment, reducing the rate of filling. A corollary to this would be a cessation of logging above the cave, if that could be arranged. Plugging up, or reducing access to the sinkhole entrance would be the next best option. Clearly this would destroy part of the natural state of the cave. However it would largely counteract the negative impact of logging above. This would be an engineering feat that would be quite complicated, and would have an unknown lifespan depending on the materials used. The best option would be to plug or partially plug the entrance and allow the vegetation to grow above until the forest has recovered. Upon recovery the plug could be removed and the cave could restore its equilibrium with the surrounding landscape.

Clearly there are a number of ethical concerns with restoring this cave related to how much human impact should be tolerated in managing the cave. I will not presume to know the answers, but I will say that it is a discussion worthy of having. The last consideration to be made is if it is worth it. Three Mile Cave is a small hole in the ground that would require a large amount of heavy labor to restore. We have to decide if our time is best spent on other endeavors, cleaning other caves, educating the public, or working on our careers. An ideal solution would be a few large work parties with many volunteers to go to the location, perform the work rapidly, efficiently, without stressing the lives and resources of a few conservation minded individuals. I leave the discussion of what actions should be taken to the grotto and hope that we, as a group, decide our conservation priorities and carry out the work quickly in order to save the natural resources we have for later generations.

Papoose Cave Supply Caches

February 6, 2007

By Bob Straub

When I began visiting Papoose Cave last year I noticed a very large difference in the size of the two survival caches. As I became a Resource Monitor and thought about potential emergencies in the cave I became concerned enough to want to know more about the caches. Note that Papoose is an alpine fault controlled cave with 3.3 miles of branching canyon passage that reaches a depth of over 800 feet. It is characterized by streams, waterfalls, and temperatures in the mid 30 degree Fahrenheit range. The cave is on U.S. Forest Service land and their management plan requires all visiting groups to be accompanied by a USFS approved Resource Monitor from the regional caving community.

Current Situation

Papoose currently contains two caches. The largest one is in the Sand Room, a central location in the upper third of the cave nearest the entrances. The second, much smaller one, is in the R&R Room in the bottom third of the cave. In casual caver conversation these caches are often referred to as rescue caches, but that is incorrect since they don't contain any rescue equipment. Rather these are survival caches which contain supplies intended to improve the comfort and perhaps the survival of a party holding off hypothermia in a 34 degree environment while they wait for rescue.

For a group of 6, the Sand Room cache contains food for two meals, dry clothing for all, a full pad and sleeping bag for one, and sit pads, plastic bags and candles for the rest. It also has some limited first aid supplies. I have been unable to find a description of the contents of the R&R Room cache. The R&R cache is contained in one blue nylon stuff sack the size of a pillow case while the Sand Room cache requires four 5-gallon buckets, a duffle bag, a plastic tube, and a similar blue sack to contain it. See the pictures below. The Sand Room is on the left and the R & R Room is on the right. Both photos were taken by Sam Lair in 2006.

In either case the minimum initial wait anticipated by these parties is the sum of the following factors; time left until the party is overdue, promptness of the overdue report, organization and travel time of the rescue party to Papoose, time required to reach/locate the overdue group. The following time spans in hours seem realistic for an overdue party in the commonly visited areas of the cave; 3, 2, 8, 3. This predicts at least a 16 hour wait until the first contact with the rescue party.

In the stranded party scenario the cache's work is done as soon as the group is reached and the combined party begins to leave the cave. A scenario with an injury is much less predicable. Much depends on whether or not the party in trouble successfully sends some of its members out with details about the injury. If the rescue party first learns of the injury when they reach the group, then it's likely that more personnel and equipment will be required and another 8 to 16 hours will pass before these resources reach the patient.

<u>History</u>

A Sand Room cache of some kind has been in the cave since the late 1960s. It's been used once when multiple parties were in the cave in 2003 and poor coordination caused a party to be stranded for 4 hours when the entrance ropes were removed prematurely. This cache was inventoried and restocked after this incident. I haven't found any information about the age or use of the R & R Room cache.

<u>Cache Scenarios</u>

There seem to be two plausible scenarios that support the existence of survival caches.

1. Equipment failure/loss, or a gate problem strands a party in the cave. Note the 2003 experience.

2. An injury or exhaustion requires all or part of a group to wait in the cave for rescue.

Consensus

Based on conversations with about 10 Resource Monitors the following consensus seems to be developing.

Overview: Papoose Cave sees enough visitors and the environment is challenging enough to support the continued existence of the two caches. Each cache should be equipped to support a group of six for 24 hours.

Contents: Each cache should provide food and hydration, shelter, insulation, and dry clothing for a party of 5 healthy cavers, and additional items to support a sixth injured person. The patient items principally include a sleeping bag or blankets, full length pad, and first aid supplies for long bone injuries. There should be a 24 hour food and water supply and a fuel for both cooking and personal warming.

Locations: The obvious location for a cache in the upper cave is the Sand Room. It has the advantage of being central to the most often visited area of the cave and virtually every party visiting the cave passes through the Sand Room. In addition it's dry, has a flat soil floor, still air, quiet, and there's plenty of room to work on a patient. Unfortunately there isn't another spot with all of these advantages anywhere in the rest of the cave.

The R&R Room location has only two attributes to recommend it. It is near the junction of all three routes to the lower cave; the Wet Way, Puberty Pit to the Great White Way, and the Grown Way. The only other advantage it has is that it is a register site and historically it has been a cache location. Its disadvantages include, wet sloping flowstone floors, dripping water, air movement, loud stream sounds, a 6 foot fall to the stream, and no good place to manage a patient. Unfortunately there isn't a better location in the lower cave.

The current two locations don't serve the Blue Water/Atlantis area, Blue Water Extension, Big Room, or Clear Water areas very well.

Recommendations

Locations: The Sand Room and R & R Room caches should remain in their current locations. Despite all of the R & R Room's disadvantages there isn't a better location available that is still on the main route to the lower cave. The areas of the cave that are not well served by these two locations don't see enough visitations to justify additional caches.

Contents: The Sand Room cache should be augmented to increase the food and fuel supply and to provide materials for water treatment. Based solely on the lack of information about the contents and condition of the R & R Room cache and its small size, plans should be made to restock it completely.

Timing: In my conversations with Resource Monitors from the Cascade Grotto I have suggested that they could open discussions with their grotto about partnering with the Gem Stare Grotto on this project for late summer or fall of 2007.

Note from the editor: The Cascade Grotto has committed to supplying two of the buckets for the Papoose R&R Room Rescue Cache. Please talk to Aaron Stavens if you are interested in Contributing.

Inventory of the Survival Cache in Sand Room as of 7/26/03
Packaged in four 5-gallon buckets, 1 duffle bag, and 1 plastic tube.

Food and Cooking:
1 can of Sterno with top
1 sealed package of food (3 soup, hot chocolate, peanuts)
12 hot chocolate (sealed)
8 ramen noodles (sealed)
Clothing:
1 light scarf and pair of socks
1 small pair of gloves
1 shirt (sealed)
1 package raingear (sealed)
1 pair of pants (sealed)
1 short sleeve cotton thermal shirt (sealed)

2 nylon stuff sacks ~18 x 30
1 long sleeve flannel shirt (sealed)
3 hats (sealed)
3 pair of socks (sealed)
3 pair of wool pants (sealed)
2 wool sweaters (sealed)
2 Patagonia synchilla shirts (in 5 gallon bucket, not sealed)
1 bright orange cotton sweatshirt (in 5 gallon bucket, not sealed)
2 down jackets (in 5 gallon bucket, not sealed)

Shelter and Heat:
7 plastic bags, thin ~30 x 30
1 heavy plastic bag ~ 36 x 36
1 bag of 15 unused votive candles, 6 used
1 large candle in OJ can
2 lighters
1 box waterproof matches

Insulation:
1 insulite pad ~24 x 48
5 small butt pads
1 wool blanket (sealed)
1 sleeping bag

First Aid:
2 instant heat pads
1 wire splint
1 package of very limited first aid supplies
2 sealed towels
1 roll adhesive tape

Proposed Inventory of the Survival Cache in R&R Room

Packaged in 6 5-gallon buckets, each numbered and containing Instructions and a total inventory

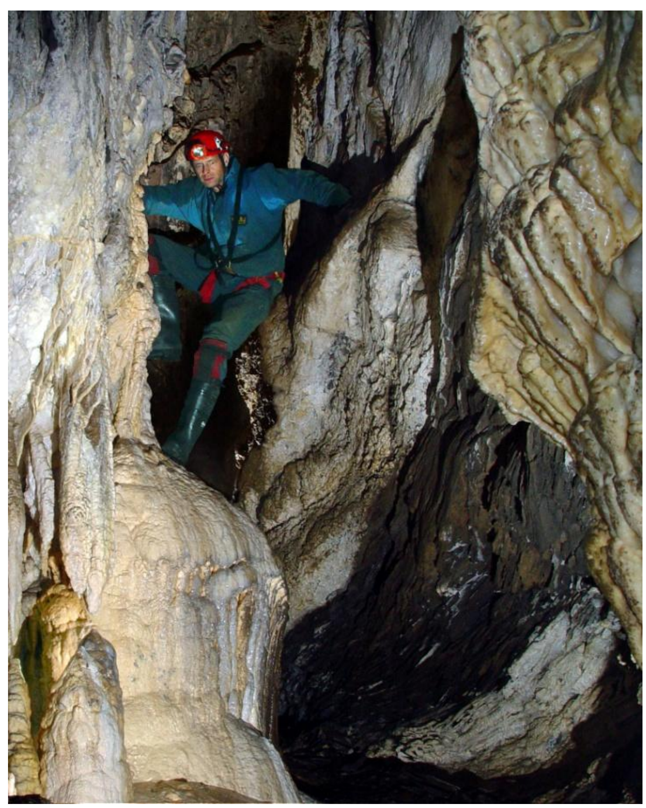
First Aid: Can 1
Notebook, waterproof with pencils
2 instant heat packs
1 wire splint
Limited first aid supplies
Wound cleaning supplies
Water treatment
1 gallon pee bottle, collapsible

Shelter, Heat and Cooking: Can 2
4 cans of Sterno
1 quart pot with lid and support
6 spoons
12 heavy 50 gallon plastic bags
Plastic sheeting 5 mill
Light nylon cord 200 ft.
6 large candles each in a can
2 lighters
1 box waterproof matches

Food: Can 3
24 individual packages of "instant" Oatmeal, sealed in groups of 6
12 "Cup of Soup" meals, sealed in groups of 3.
12 hot chocolate packages, sealed in groups of 3
12 hot cider packages, sealed in groups of 3

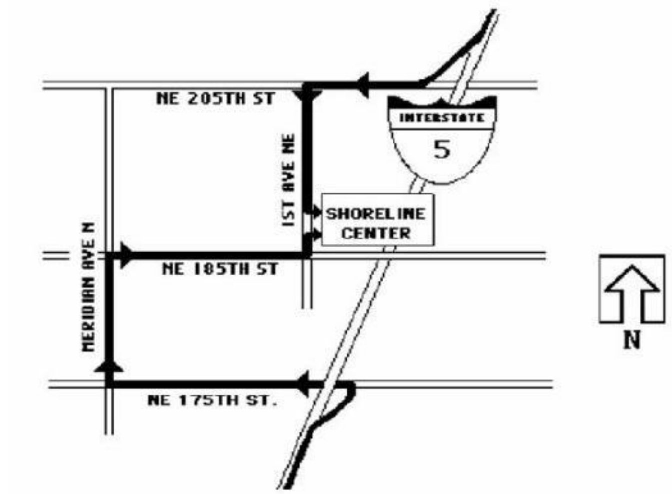
Clothing: (sized medium and large) Cans 4 & 5
6 fleece or wool shirts or sweaters
6 long sleeve synthetic under shirts
6 fleece or wool pants
6 synthetic long john bottoms
6 Watch caps
6 pairs of gloves
6 pairs of wool or synthetic socks, (medium to heavy weight)

Insulation: Can 6
1 insulating pad ~24 x 48 (probably won't fit)
5 small butt pads
1 10x20 tarp
1 wool blankets (sealed)
1 sleeping bag synthetic



Jon Crouch in a passage below the R&R Room in Papoose
Photo by Michael McCormack

The Cascade Grotto meets at 7:00pm on the third Friday of each month at the Shoreline Community Center. The Community Center is located at 18560, 1st Ave NE in Shoreline. To get to the Community Center from Seattle, take Exit 176 on Interstate 5 (175th St. N) and turn left at the light at the bottom of the off ramp. At the next traffic light (Meridian Ave. N) turn right. Turn right at 185th St. N (the next light). Turn left on 1st NE, which again is the next light. The Community Center is on the right. Don't get confused with the Senior Center, which is on the end of the building. Enter the building on the southwest corner and find the Hamlin Room.



Cascade Caver
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