



FUSSI Newsletter

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BRONYA NEGOTIATES THE MATCH-BOX SQUEEZE, MIDNIGHT HOLE,
IDA BAY, TASMANIA.

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BAT PHONES IN THEIR NATURAL HABITAT

Paul Gardener-Stevens

Today Serval and VillageTelco did something rather unusual with a mesh potato – we took one deep underground. The day started with a drive to my arranged meeting place with the [Flinders University Speleological Society](#) in the Adelaide Hills. The day had an unusual start with pea-soup fog. Unusual because it is the middle of summer. Fortunately our car didn't end up like the one that was sitting in the parking lot where we were meeting. Also, we were very glad that we weren't suffering flooding, unlike some other parts of Australia, although we had niggling worries about the higher Murray River level and whether we would be able to get into the cave to do our testing.



While we were waiting for people to turn up a cat came from a nearby restaurant to check out our prototype Serval Field Communications Kit. While not a [serval](#), but it did have stripes, and sometimes you take what you can get. The cat then begged a salted biscuit off us. Something tells me that it is a bit too used to having restaurant scraps.



The rising water was a concern for us as the cave we were visiting is on the banks of a lagoon on the river. During the drought, the lagoon dried up, but from the cliff top we could see that the lagoon had filled up, and we worried that the water might have come right up to the mouth of the cave.

Here are the FUSSI people unpacking and getting ready. From left to right we have Thomas, Clare, Bjorn,

BAT PHONES IN THEIR NATURAL HABITAT

Heiko and Bradley. Edwina was hiding somewhere out of frame.



Then it was the walk to the cliff top to see just how much the lagoon had filled up. Apparently quite a lot. Those green blobs in the water are gum trees that until very recently were growing on the dry lagoon bed. Hmmm.



There was only one way to find out; walk down the cliff. This time Edwina couldn't hide from the camera. This part of the cliff was quite steep, and I was happy that the



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FUSSI people were carrying my pelican case for me.



After a bit of a walk along the base of the cliff, we reached the mouth of the cave, which was fortunately a couple of metres above the river level. However, there was an unexpected surprise: a group of people had been visiting the cave to have a poke around. As you can see, this cave has quite a big entrance.

They were just finishing up, and then we had the cave to ourselves. But we did get them to take a picture of us all before they left.

In fact, this cave is pretty big inside for a cave along

the Murray River, which was nice as it makes it more representative of a mine, which is what I was most interested in, i.e., how far WiFi would go in an underground mine (not through the rock, to which the answer is “about 30cm if you are lucky”).

WiFi easily does hundreds of metres in the open air if there is no interference.

Underground, there is no external interference, however there a big problem called “multi-path fade”. This is basically the radio version of echoing.

All the echoes in a cave can be quite loud and make it very hard to understand what the person is saying, even though you can hear them. It is the same with WiFi underground; plenty of energy gets to the receiver, but it is all a jumbled mess because of



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the signal bouncing off the walls. I asked my RF-savvy mathematician friend to see if there were any theoretical studies that might suggest how far the signal would go underground. He found some studies that suggested about 30m. So we packed a 30m measuring tape to see if we could get the signal to go that far. This meant that we needed a tunnel that was fairly flat and straight for at least 30m. Thus my happiness at the size of this cave that would let us test this, as experience has taught me to test anything radio rather than believe theory, as there are often factors that have not been fully considered.



One question that I have still to explore is the effect of the rock type on the range we can obtain. This cave is a rather porous limestone that is filled with holes and pockets that I suspect might make it reflect less than some other types of rock. You can see what I mean about the holes from the photo on the left.

So, the first test was to see how far we could get a WiFi link from inside the cave mouth. We started with my increasingly favourite, the LiPo powered mesh potato, complete with Telstra rental handset.

At Right: The LiPo powered mesh potato, complete with Telstra rental handset.



We then got a pile of Serval BatPhones ready, and started testing. Over the page you can see our mesh telephone network in a box, if a little too literal. We didn't use the satellite terminal today, but we expect that we will have it integrated ready for our next tests.

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We had some of the FUSSI people stand as far in the cave as they could without losing line of sight, and then I talked to them via Mesh Potato and then BatPhone. We used a 30m line to make sure we were getting the theoretical range. In fact, even with a low rise in the floor partially obstructing things, we got at least 40m, and couldn't test any longer in a straight line without me being outside the cave.



At left: The mesh telephone network.

Then we deployed Serval BatPhones as waypoints throughout the cave. You can see one on the floor in the picture below right and one on a ledge on the left.

Note that the waypoints were just placed on the floor or on convenient ledges with a little care, but without resorting to mounting them on

structures to give them better clearance.



I then went as far as I could into the cave while maintaining a clear call with Thomas outside the cave. We had a few corners and obstructions to work around, even so, by the time we had deployed 4 BatPhones as way points I was about 88m inside the cave, and was able to clearly talk with Thomas. Oddly, this cave has a couple of big logs in it. One of these made a comfy seat for me while I spoke to Thomas outside through almost 100m of solid rock as the neutrino flies – all with less than \$1,000 of hardware. That's less than \$10/metre for a pretty reasonable underground communications system.

BAT PHONES IN THEIR NATURAL HABITAT



Then it was time to pack up the technology and enjoy exploring the cave. On the way back out I had a blow out, not on the car, but on my boot. The sole completely delaminated and required some jerry rigging to get me out of the cave.

Once outside, the sole flopped all over the place, so

I just walked up the cliff with only one shoe. However, it was well worth it, as we had confirmed that the theoretical predictions about WiFi propagation underground were more or less reasonable, and indeed we had managed to setup a chain of BatPhones to allow us to call almost 100m underground. If we had the satellite link integrated we could have called across the world, or at least to the nearest pizza bar for lunch.



The Latte Set!

ON THE LATTE TRAIL IN THE SOUTH EAST

Sarah Naone

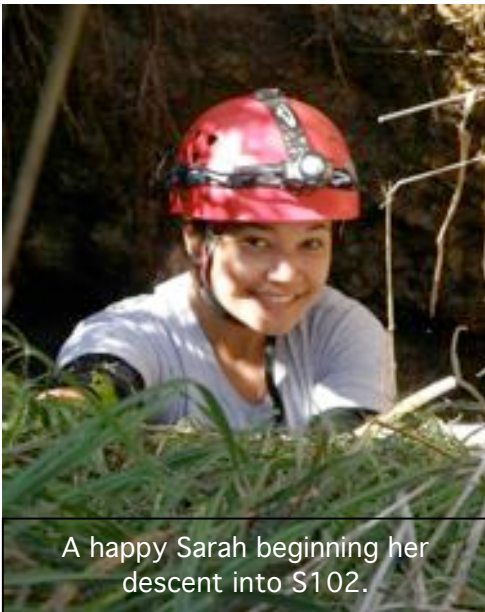
19-20th March. People on the Trip: Clare, Thomas, Bronya and Sarah.

The weekend was overall a crazy blast of fun.

Clare was gracious enough to pick me up from Uni in the afternoon on Friday where we collected some equipment we would require that weekend. We took a trip to the Central Market for some groceries and were on our way to The Hills. This was my first visit out to The Hills and it was so beautifully scenic. I mentioned to Clare that I hadn't been to Hahndorf so we took a little detour through the beautiful German town which fed my need to revisit.

We arrived at Clare's home in the evening and started gathering all the equipment and items she needed. I was also able to borrow a lot of things from Clare that I am not in possession of because I am only here for one semester. It was really cool. Bronya, Thomas, and Heiko came around during the later part of the evening and, after a delicious dinner of pizza and wine, we packed into one car and headed out.

I was a bit sleepy so I dozed off in the car. The car ride took about four hours from Clare's home until we reached our camping site around 11 p.m. We unpacked our tents and were able to sleep around 12:30-1 a.m.



A happy Sarah beginning her descent into S102.

Saturday morning we drove through the visitor's centre and I was able to look over a lot of the information they had to offer. We weren't able to get the key for Sundays cave just yet so after Thomas had his coffee fix we set out to S102.

The farmer was a nice man who let us look over his sunken solution tube of another cave entrance. This didn't give me much confidence about our descent but I'm glad I did it. It took awhile to rig the ropes and such as I'm guessing it was Thomas and Bronya's first attempt. I think they did rather well! After Thomas was safe at the bottom of the cave entrance, I was belayed down the ladder under Bronya and Clare's watchful eyes. I would later understand why the ladder had such a horrible reputation.

My first impressions of the cave were much to be expected. It was cold and dark with many different passageways to follow. We were led in and were able to see the giant sand dune mound that had been directly below the first sunken cave we had look down into. The first time I saw animal bones I was a bit freaked out until I was of the understanding that animals fall into caves and die. It was somewhat reassuring. This cave was a lot bigger than I expected it to be and it even had the beginnings of some stalagmite, which I was very excited to lay witness to.

Once we got to the end of the cave I was able to explore a little further with Bronya behind me

ON THE LATTE TRAIL IN THE SOUTH EAST

until my thirst for discovery had been quenched. We then sat in the dark with our headlamps off which was such an amazingly surreal experience! It was quite peaceful.

I was given the opportunity to lead the crew out of the cave and was successful! The climb up the ladder may have been both the worst and most rewarding experience of the day because of the immense difficulty I had using my entire body strength to pull myself out of this hole. I'm proud that I was able to do it and felt like a hardcore caver!



A Section of Cave Scratchings in S102.

We returned to camp for some dinner and wine which we zipped through in order to catch the bats' departure from their cave. It was yet another amazing experience to watch them flock by the thousands to hunt for the evening. My guides were quite informative in all the questions I had been asking throughout the trip thus far.

Thomas and Clare did a little cave exploration that night that need not further be explained. Suffice it to say that they don't let anything get in their way! After a millipede shower we all took an early retirement because of the early start we would have in the morning.

The next morning we headed back to the visitor's centre to collect the key that had in all actuality been lost by Steve. No one minded so much because it meant that we would have more time to explore Wrecked Car Cave and pack up our things.

Wrecked Car Cave required no rigging, thank god. I was *not* in a ladder mood. It was however a crawl for about 85% of the exploration. I didn't mind so much though because of the elbow and knee pads Clare let me borrow. It was full of cave formations and beautiful sites to see. Bronya was right at guessing that this cave would be my favourite. I learned how delicate straws were formed. I also learned that I am a lot more cat like than I thought in my ability to crawl through very tiny spaces. We got a little lost but I think it made the journey all the more fun. It really was a spectacular cave full of history and I'm so glad to have been given the opportunity to explore it.

Sunday night we headed back to camp to pack all our belongings and make the drive back. It was nice being able to sleep in the car. We all split ways at Clare's home and Bronya took me the rest of the way to uni. Bruised and sore muscled I still hold to the fact that the weekend was so ultimately fulfilling. The company was very warm and fun and I cannot wait until the next trip. Hopefully I'll learn to build up a love for lattes by then.

SECRETARY'S REPORT

Bronya Alexander

Since the 2010 AGM FUSSI has had about 9 caving trips spread across Yorke Peninsula, Flinders Ranges, Naracoorte and Mt Gambier, as well as a 2-week vertical trip to Tassie for the four of us lucky enough to go! As well as these caving trips we've had a number of training sessions including some general meetings to practice knots and discuss cave rescue, which were popular judging by the turnout!

We had 15 members in 2010, but most excitingly 7 of these were new to FUSSI, and already this year we've had another 4 new members, so hopefully we can keep up this positive trend!

A particular highlight during last year was the success of our sausage sizzle fundraiser at Bunnings, Marion. While it took a fair bit of organising, we shared the jobs round and had a good turnout of members on the day to help make it a big success and worth the time and effort involved. Hopefully we score another opportunity to increase our sausage flipping skills this year! And more importantly, make the most of our fundraising efforts by having another fun year of underground adventures!

SAFETY OFFICER'S REPORT

Paul Waclawic

2010 was a safe year with lots of cave rescue practice done at Corra Lynn Cave on the Yorke Peninsula. Nobody fell off things and Mavis did not come on any trips. While all caving events were conducted safely, the safety officer was kidnapped by Mavis and forced to work in a Spanish sulphur mine for the year. I shall be re-advertising the position of 'Mavis Abatement Officer' in the Newsletter when I escape.

GEAR OFFICER'S REPORT

Clare Buswell

FUSSI Gear Officers seem to have moved around the country and the globe in 2010 as much as the club gear did. Nate Kock did a great job of putting locks on the gear cabinets to prevent any further pilfering of our gear. As around \$5,000.00 worth of gear was stolen at the beginning of 2010, we have had to replace some of it. Principally that has been lights and pulleys. We still have to replace the stolen harness, whale tail and three ascenders. As the club has a replacement programme for its gear, we are now playing catch up as a result of the theft. I recommend that in 2011 the club replaces: a harness, whaletail and ascenders. It would also be of use to add a couple of more lights into the mix. I also recommend that the club purchases the ASF CSR open source stretcher as an addition to our drag mat. Given the amount of fund raising that went on in 2010, we are in a financial position to do so.

FUSSI has around \$11,000.00 worth of gear plus its library. The most used items are helmets, lights, harnesses, ladders, ropes and karabiners. Below is a rundown of the current gear costings for FUSSI per line item.

FUSSI GEAR LISTING & COSTS

Quantity	ITEM	Cost/ea	TOTAL
10	Helmets in use		\$774.50
10	Petzel Lights		\$225.00
23	Battery inserts	\$15ea	\$345.00
6	Princeton Tec Apex Lights	\$139ea	\$837.00
14	Helmet Clip sets	\$6.00ea	\$78.00
2	Oldham miners lights /charger	\$290ea	\$580.00
3	Ropes		\$620.00
1	1X10m Bluewater 2 for drag mat		\$30.00
8	Rope Protectors		\$120.00
10	Harnesses		\$1,012.00
5	Descenders		\$1,280.00
9	Ascenders		\$918.00
77	Karbiners/Maillons		\$1,424.00
35	Metres seatbelt tape	\$4.00/m	\$140.00
93	Metres tube tape	\$3.40/m	\$316.00
8	Cows Tails Sets		\$240.00
2	Stitch plates		\$60.00
3	Ladders & Wire Traces		\$440.00
14	Sundry Gear Bags/ Back Packs		\$450.00
4	Pulleys		\$371.80
	Surveying Gear: Compass/Clino/tape		\$400.00
	Sundry Bits		
1	Wooden crate		\$100.00
4	25lt water Containers		\$80.00
1	Drag matt		\$100.00
3	Foam Mattress		\$45.00
2	Electric Lights camping		\$50.00
3	Black/White Plastic crates		\$120.00
3	Lids for above crates		\$30.00
1	Electric Jug		\$15.00
1	Silk Screen		\$100.00
3	Pots silk screen paint		\$50.00
4	Plastic 4 gal buckets		\$8.00
2	First Aid Kits		\$400.00
2	Cooking pots		\$180.00
	TOTAL*		<u>11569.90</u>

Costs are at current rates and in Australian Dollars!

TREASURER'S REPORT

Thomas Varga

For the Period 1 March 2010 – 31 March 2011

Overall summary

Opening balance	Income	Expenditure	Closing balance
\$4,865.81	\$2,308.67	\$1,652.55	\$5,521.93
		Difference	\$656.12

FUSSI monies were stored in two locations: a bank account with ANZ and petty cash.

	Bank account	Petty cash	Total
Opening balance	\$4,714.81	\$151.00	\$4,865.81
Closing balance	\$5,269.63	\$252.30	\$5,521.93
Difference	\$554.82	\$101.30	\$656.12

Breakdown of income

Bunnings Marion Fundraiser	\$1,161.60
FCCS Grant	\$700.00
Member contributions (membership fee + gear hire fee)	\$446.50
Bank interest	\$0.57
Total	\$2,308.67

Breakdown of expenditure

Gear purchase (SRT gear, lights, camping equip.)	\$1,442.15
Professional subscriptions	\$55.00
Operational (photocopy, catering, domain name)	\$155.40

Treasurer's Notes

- 1) The Bunnings Marion fundraiser was – from a financial perspective - a great success.
- 2) FUSSI applied for FCCS grants twice during this period. The first application was not successful the second one was. As a result of the successful grant FUSSI was able to purchase \$1208.80 worth of SRT and caving gear by contributing 508.80 (42%). The remaining 700.00 (58%) was provided by FCCS.
- 3) Disregarding the gear purchase funded by the FCCS grant, other gear purchases still remained the largest expenditure item. $\$1442.15 - \$1208.80 = \$233.35$.
- 4) ASF fees (which all members pay) have remained unchanged for the current year.



Source: *The Advertiser*. Saturday March 26. p. 21.



Is this a typical covers house?

Just what are those brooms doing?

If you want to know what these FUSSI members are up to, you will have to wait until the next exciting instalment of the

FUSSI Newsletter!

WHAT IS ON

March	18 th -19 th	South East. Beginners trip. Contact: Bronya
March is	31 st	AGM. Meet 5.30 pm Library foyer. Meeting itself is in 154 SSS. Car Park 3.
April	3 rd	Yorke Peninsula. One day trip. 3D Caving. Contact: Michael.
April	18 th -25 th	Middle Flinders, cave mapping and surface exploration. Come for part or come for all of it. Contact: Bronya
May	19 th	General Meeting: <i>Guest speaker: Trevor Arnold. State Emergency Services.</i> Topic: Rescue stretchers and gear. 6.30 pm
May	20 th -22 nd	Flinders Ranges. What fun, caves and dust? Contact Bronya.
June	TBA	One-day trip. Corra Lynn: Contact: Michael
June		General Meeting. What Rock Bands Really Matter? Guest Speaker: TBA.
September	17 th -2 nd Oct	Nullarbor. Caving, exploration, mapping and bat detection. Dates to be confirmed by March 31 st .

Up-coming caving conferences:

April	17 th -22 th	Australian Speleological Federation's Biennial Conference. Chillagoe, Far North QLD. JUST GO TO IT.
May	19 th -22 nd	Australasian Cave and Karst Management Association's Conference. Ulverstone. Tasmania.
September	19 th -25 th	2011 Gathering of all European Cavers Marbella, 50km from Malaga in southern Spain. The event includes: 8th European Symposium on Exploration and Expedition Speleology 1st European Women & Speleology Day 3rd EuroSpeleo Image In Film Festival "Speleo Europa Cinema" 1st European Open Air Vertical Progression Techniques Games. Lots of Caving. Contact: http://www.espeleo.es/euroespeleoforum/english/index.htm