# **SKETCHER GUIDELINES & SURVEY PRODUCTIVITY**

Marc Ohms Physical Science Tech. Wind Cave National Park

The following is a list that I came up with while entering new survey data or reviewing old data in the ongoing quest of managing the data and fixing bad loops in Wind Cave. By following these simply procedures, it will make my job of entering the data much easier, ensure quality of your work, increase your productivity, and allow me and those in the future who have to work with the data to do so with greater ease.

### The Data

I believe that the data is the neglected child of the survey process. I see many folks get too wrapped up in trying to make the sketch so beautiful that the quality of the data suffers. If your sketch is bad or you simply forget to sketch, I can still use the data. I can still determine where the cave goes, its depth and length, and its relationship to the rest of the cave and the surface. If you come out with a beautiful sketch but bad or no data, it is worthless. You wasted your time, our time, and impacted the cave for no return benefit. I can do nothing with it. Don't get me wrong, the sketch is very important. My point simply is that the data is equally important and equal time and effort need to be spent to ensure it is neat, accurate, and complete.

Remember that as the sketcher you are setting the pace of the survey. If you need to slow down then tell your crew to slow down. Remember that the goal is not only to get as much footage as possible but to get good usable accurate data. I would rather see 200 ft of good data than 1000 feet of problem-ridden data.

1. Record the data clearly and cleanly. Write <u>very</u> legible, the points prominent, and the + or - are very clear. Don't be shy about using your eraser as needed.

2. On the data page use the station's full name. For example, if the station is XY12Ause that, not A or 12A. There are hundreds of A's, or even 12A's in the cave. Write it out in full <u>every time</u>.

3. On azimuths and inclinations always follow the point with a zero when appropriatei.e. 128.0, +7.0... If the reading is zero write 0.0. Zero does not mean "nothing", on azimuth it is due north, and on inclination it is level. Zero is a reading, treat it as such!

4. On inclinations have a plus or minus on every shot. Never leave it off.

5. On distance, you should record to the nearest hundredth of a foot, which means you should have as many following zeros as needed. For example- 12.00, 1.50...

6. Do back sights on every shot. Back sights include azimuth and inclination.

- 7. Do backsights, <u>not</u> double frontsights. A backsight azimuth is 180 degrees from the frontsight (ex. 180- 360). Do not record 180 and 179, which are two frontsights, not a backsight. The same goes for inclinations- do not record +7.0 and +7.5. You should never be reading the small numbers on an instrument- that represents the opposite direction of which you are reading. If you record data in the backsight boxes, they <u>must</u> be backsights. If you are going from station A to B, the reader sits at station A and reads to station B- that is a frontsight. If the reader reads from station B to A, that is a backsight and should represent that direction, therefore being 180 degrees from what he/she read from A to B.
- 8. Be sure that the back sights are within 2 degrees of the front sights. I have installed back sight cheat sheets in all of the survey binders to help you determine the correct back sights.
- 9. Be very sure of your tie-ins. In Wind Cave there are over 32,000 survey stations that we use. There are also many that we no longer use for various reasons. Check line plots to be sure that the station you are tying into is a station that is used, and it is in the right position. It does not hurt to check the next station to confirm it is what you think it is. <u>Always</u> have a current line plot with you. Be very certain that the station is exactly what you say it is. If for any reason you are not positive of the station, make a note stating that. That way, that will be the first thing I check if I discover problems.
- 10. Be sure to listen to your instrument and tape persons. <u>Repeat</u> the readings and be sure they <u>confirm</u> you heard them correctly. Write them as you repeat them, not minutes later.

### The sketch

- 1. Sketch cleanly and clearly. Use the eraser as needed.
- 2. Draw the survey lines on your sketch.
- 3. Write the station labels clearly. Place them outside the passage in smaller passages.
- 4. Keep written notes to a bare minimum. They tend to clutter the sketch and the information can better be record with the inventory or the use of symbols.
- 5. Sketch the tie-in shots. Do not assume that the passage has been already sketched since it has been surveyed. For starters it may have been surveyed in the 60's and the sketch is not up to today's standards. Also, if I discover a blunder it will help determine if you truly tied into the station you said. Example- if you claimed to have tied into JF4 and drew it on top of a rock, and I check the JF notes and see that JF4 is at the top of a pit, I can then conclude something is wrong. I do not need a super complete sketch but at least a general sketch of the passage and area. If you start your survey out of the Club Room, I do not need you to sketch the entire room. However,

a general sketch of the tie-in area to indicate the whereabouts of your stations is helpful.

- 6. The pre-printed paper that we provide has a set scale of 20 feet per inch and north pointing to the top of the page. Do <u>not</u> change this.
- 7. Always indicate what a lead does. Is it too tight, tight, or a dig? Is it 2' x 5' or 2' x 1'? Not only does this help the cartographer, but it helps future cavers decide which areas to go to.
- 8. When side passages are already surveyed or they connect to a known survey, state that on the sketch. For example, write to HF23 at the end of your sketch of that passage. This is a tremendous help to the cartographer.
- 9. Once out of the cave, review your notes. Make sure the data and sketch are clean and neat, pages numbered, title page completed, etc.... A blank on the title page means you are missing something. There are maps showing sections and quads on the closet door in the VIP Center to help you determine which you are in.

## SURVEY PRODUCTIVITY

Productivity is how we judge the success of the trip. We are not trying to increase productivity simply to make the cave longer. As managers of this cave we must prevent needless impact. We must remember that any and all trips into Wind Cave cause impact, and that impact is accumulative. We cannot travel through this cave without causing some impact, so to justify going into the cave the outcome of each trip must outweigh the impacts caused. To do this successfully each trip needs to be productive.

Productivity is not necessarily only defined by the amount of survey you obtain. Other factors such as where you go in the cave, how long you spend surveying, the size of the passages surveyed, the number of stations set, the number of leads surveyed versus how many leads were left, the quality of the data and sketch, all factor into your productivity.

To better illustrate the role of productivity let's say there is an area in the cave 500 feet long. A team of three goes in and surveys all 500 feet in one trip. Now take another team of three to the same area. They survey 150 feet on the first trip, 200 feet on the next, and then finish it on the third trip. They both did the same thing but who had less impact on the cave? Obviously the first team who only had to do one trip to accomplish the same thing the second team did with three trips. This not only is less impact to the cave but allowed the members of the first team to do two trips elsewhere in the cave while the first team is still returning to the same place. The more productive you are the more cave you get to see!

The following are some tips on how to make your trip more productive.

Do your homework. Have a good area of the cave picked out by utilizing maps, survey data, trip reports, and other cavers. Have plenty of leads, more than you think you will need. Look for areas that no one has been to in a while. If no one has been in a certain area since the 1970's you are pretty much guaranteed some good survey. Back then things were wide open and they typically surveyed the bigger stuff leaving many leads behind. Conversely, avoid areas that have seen many recent trips as chances are there will not be a lot to survey in those areas. For example- do not expect to find much to survey by looking along the trail to the Club Room.

Avoid bouncing around the cave. Picking an area and returning for several trips will tend to pay off more then bouncing around to different areas each trip. By doing so you will learn the route in and out, therefore reducing your travel time, learn where the leads are, and will begin to understand what has been surveyed and how it all relates.

Survey what you find. Be methodical by surveying each lead as you come to it. If a lead ends after 15-25 feet- survey it! It won't take long to do and you will be gaining footage and checking leads off as you go- meaning you are being productive. If you simply scoop them without surveying, hoping to find the "one" that goes, before you know it the day will be over and you will have little to nothing to show for it, not to mention that you have impacted a lot of cave for nothing. If you survey the leads as you go, you will end up with quite a bit of survey, even though no one lead went very far. After all, Wind Cave is largely comprised of dead-ends and short interconnecting passages.

Manage your time efficiently. When you arrive at your destination make a game plan. Everyone should eat, drink, pee, change batteries, etc. Then set a schedule such as every hour or so everyone will take a break for 10 minutes. This puts everyone on the same schedule so that people are not breaking at odd times during the survey while everyone else is waiting for them. Inevitably someone will have to take a break other than the set time. Just like traveling with the kid having to use the restroom ten minutes after stopping because they "did not have to go then." If, or when this happens continue with the survey by having someone fill in. If you have four people have the inventory person step in the vacant role for a shot or two. If you only have three you can still have someone else pick up the missing duty. Granted you will be slower but as least things are still moving forward. Plus it tends to speed up the person taking the break.

Efficiency is the key to productivity. If your survey team is efficient, meaning they manage their time well, your trip will be productive. Each member of the survey team needs to become proficient at their tasks, be ready to perform those tasks when needed, and perform them quickly. No one should ever be sitting around waiting for another person to compete their task. Each position has group tasks and solo tasks. Group tasks are those that another person of the teams is involved in or needs to have completed before they can complete their task. An example is reading the instruments. The lead tape person is involved by holding a light on station and the book person is waiting to record the data and begin their sketch. A solo task would be to make and place the survey tag. Learning how and when to complete your tasks to allow the survey to flow smoothly will greatly increase your productivity. Here are some tips-

## Lead Tape-

The lead tape person is responsible for the establishment and placement of survey stations and assisting in reading the tape and instruments. Assisting in reading the tape and instruments is a group task and should be completed first. After that is completed then mark and label the station while waiting for the sketcher to complete their sketch. If the tape person marks and labels the station before doing the readings, the sketcher and instrument readers are waiting- meaning time is being wasted. This one thing will save 2-3 minutes per shot, which if you set 20 stations this alone will save you up to an hour!

The tape person can really make or break the productivity. Many times trip leaders put the new person on lead tape. This is a horrible mistake and will cost you much time. The most efficient is a person who has experience doing the other positions of the team. Knowing where stations will best serve the sketcher and where stations will be comfortable for the instrument reader to use will greatly speed up the survey.

Do not use your headlight to light the station. This totally commits you to just sitting there doing nothing while the instrument person does their thing. Use a mini-mag or some sort of small LED light that is not attached to your helmet. Many times you can simply place the light on the station freeing your hands to complete your solo tasks. Even if you have to hold it there with one hand you still might have enough dexterity with the remaining hand to mark the station and start eyeing up the next shot.

Do not spend 20 minutes searching for the "perfect" station. Perfection is largely overrated if not unattainable- get over it and simply pick something that works and go with it. It might not be the best, but if it works it works, and in the long run you will be saving time.

I made a survey necklace that really turned out to be a time saver. It consists of a loop of cord I wear around my neck with a small binder clip to hold the tags, a mini-biner that holds a LED light, and the Sharpie clipped directly onto the cord. Rather than fumbling around trying to locate the items in my pocket and deal with the rubber band on the tags, everything I need to set a station is around my neck in one place. I intend to make a bunch of these for your use soon.

### Instruments-

The instrument reader is responsible for reading the instruments. This job has the least tasks and if you only have three people, this person should do the inventory. I always have this person reading the tape as well. For one reason, they have the least amount to do and two, as sketcher I am typically located closer to this person then the lead tape person. By having this person read the tape it provides much better communication then trying to yell to the lead tape person.

In the ideal world it should go a little something like this- the tape person says "on station", the instrument person reads tape, then drops the tape and then reads compass, then clinometer. Holds light on station for back sights, and once that is done reels in the

tape and does inventory (if only three person team). Note that they did the group tasks first then did their solo tasks.

### Sketcher-

The sketcher is responsible for recording the data and sketching the passage. Typically the sketcher is the slowest job due to the time it takes to do the tasks that they have to do. The sketcher should never do inventory and only help out with back sights if you have a two-person team. They have enough to do without being weighted down with more tasks. Sketching quickly comes with time and experience. The more you do it, the better and faster you should become. With that said, do not allow the quality of your sketch to suffer to obtain quantity.

Do not total up the footage while everyone is waiting for you; instead do this while everyone is taking a break. If you ever find yourself ahead of the others use the time to number the pages, check for missing data such as LRUD's, draw a cross section, add a ceiling height, or turn the page and get it ready to go so when you do have to start a new page you are ready.

### Summary-

Your survey team members are like wheels on a car, one flat tire and you are pulling over. Meaning it only takes one person on your team to slow down the whole process. If you think your team is not being as productive as it should be, pay attention when tasks are being done and try to figure out where time is being lost. Work with that person(s) to get them up to speed.

We hope this does not sound as if you cannot have fun and enjoy your trip into Wind Cave. It is our hope that as you become more productive in the cave your enjoyment level increases along with it. We do not want to see "all work and no play, makes the cavers go away." We appreciate beyond words what volunteer cavers have done and continue to do for this park. We feel we have a great system and are simply trying to make it even better. Please feel free to send us any comments, suggestions, two-bit opinions, or tips that you have. We would love to hear them all.