Cave Guiding Standards

for

British Columbia

and

Alberta

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B- "Best Practice in Visitor Management" by Elery Hamilton-Smith et al.

C- "Caving Codes of Conduct" British Columbia Speleological Federation

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E- British Columbia Cave Rescue 'Small-party Self-rescue' Skills Guide

Cave Guiding Standards for British Columbia and Alberta

Introduction

For thousands of years, humans have been visiting caves. Whether it has been for shelter, ceremonial purposes, exploration, recreation, or scientific enquiry, caves have long been a source of attraction.
People are also starting to understand the crucial role that caves and karst areas play in maintaining healthy ecosystems and clean water supplies, and scientists continue to gather an abundance of unique data from inside cave systems.

In our modern society, with leisure time and recreational activities widely available, caves have seen an enormous increase in human visitation. However, every single person who visits a cave has an impact on the cave.

Some parts of cave systems are incredibly fragile, with crystal formations that grow only millimeters every century, with delicate sediment beds that hold a wealth of scientific information, and with passages and chambers that are so still, dark, and quiet, that the biggest event in a 24 hour period may be a cave insect excreting it's waste products. Other parts of caves are less susceptible to human impact, and can handle frequent visitation without serious damage.

Unfortunately, many people who visit caves do not have the knowledge and experience to avoid sensitive areas and to keep their impact to a minimum. Untold damage has been done to many caves in western Canada (and across the world). Most of the damage has been done through sheer ignorance, though in some cases caves have been purposefully vandalized.

This lack of knowledge and experience has also been the cause of people getting hurt in caves. While caving can be a very enjoyable, educational, and low-risk activity, most caves have some risks that need to be managed.

A large number of people visit caves as participants in guided groups. Commonly, these groups are from Scout, Guide, Church, School, and Youth organizations. There are also several commercial guiding businesses in British Columbia and Alberta that conduct cave tours on a regular basis.

Within the caving community, concerns have been raised over the years about poor guiding practices in caves. While most established cave guiding businesses run excellent tours with impeccable safety records, some groups visiting caves have not been so diligent.
Some of the concerns include:

- Poorly equipped participants
- Poorly equipped guides
- Inadequately supervised and managed groups
- Lack of education about caves and caving
- Lack of cave conservation principles demonstrated and taught to participants
- Guides with questionable experience and competence levels
- Excessively large group sizes
- Inadequate, if any, risk management and tour planning

This document addresses these concerns by providing clear and simple standards for people guiding groups through caves.

The aims for developing standards are as follows:
1) To prevent people from being harmed.
2) To prevent caves, and the access routes to caves, from being damaged.
3) To ensure that visitors receive a quality educational experience that instills an appreciation and respect for caves, and teaches and motivates visitors to protect caves and karst areas.

One of the main hurdles with developing a set of written standards is that every cave, and every group that visits a cave, is different. However, there are plenty of common elements to all caves and to guiding skills. While the exact interpretation and risk-management of a cave are site-specific, many things are applicable to all caves, such as group management, cave conservation, interpretive and presentation skills, cave rescue, general risk management techniques, liability awareness, cave travel techniques, routefinding and route selection, cave photography, general caving knowledge, vertical rigging and ropework, etcetera.

This document outlines the basic "industry standards" that cavers, along with professional cave guiding operators, feel are the minimum requirements that should apply to any cave guiding situation.

Section 1: Cave Guiding Standards

Equipment

For group members (including the guide) entering a cave beyond the twilight zone:

1.1) Every person should have a helmet with a chinstrap.
For horizontal caves, hard-shelled helmets such as construction hard-hats and rockclimbing helmets are ideal. Each helmet should have a secure, adjustable chinstrap.
Bicycle helmets are best avoided, as rock protrusions can make contact with the head through the air vents, and chunks of foam can break off the helmet if it rubs against the cave walls.
If the group is undertaking vertical ropework, commercially manufactured and approved rockclimbing/mountaineering helmets should be used.

1.2) Every person should have at least one electric light
Ideally, the light should be helmet-mounted to leave the hands free for moving through the cave, to reduce the risk of dropping and breaking or losing the light, and so that the light shines where the user is looking. Carbide lamps are generally unsuitable for groups of beginners. Avoid candles due to their poor reliability, and avoid pressurized lanterns due to the fire and broken glass hazards.

1.3) Every person should be suitably dressed for the cave
Ensure everyone has adequate footwear, and is dressed appropriately for the temperature of the cave and the length of time they are spending in the cave. Avoid wearing 'paper' coveralls (commonly used for toxic cleanup), as they tear easily and litter the cave.

People in the role of guide or leader in the cave should have (in addition to the above):
1.4) At least one spare electric light (preferably helmet-mountable)

1.5) A small first aid kit
A suggested First Aid kit may include:

- 1 tensor bandage
- 1 triangular bandage
- 1 sterile compress with tails
- Assorted bandaids
- Antiseptic wipes
- Foil space blanket

It is also prudent for the guide to carry a small cave pack containing items such as spare bulbs and batteries, high-energy snacks, a lightweight balaclava, small pocketknife or multi-tool, and a small notepad and pencil. Duct tape is also very valuable for a variety of uses.
On long cave tours it may also be prudent to have access to extra gear to keep the whole group warm, and to enable the group to self-rescue, in the event of a problem deep in the cave. Such equipment may include:

- Warming devices such as small heat packs, candles, and a lighter.
- Extra 1st Aid equipment such as bandages, dressings, splinting material, etc.
- Space-blankets, clothing, and a foam mat, to treat shock and prevent hypothermia.

> Having access to this type of equipment in the cave can present logistical problems, but guides should seriously assess their options and abilities for caring for (and self-rescuing) their group in the event of a problem occurring on a long trip.

1.6) For caving involving vertical ropework, guides should carry self-rescue equipment such as pulleys and prusiks, **and be competent in their use through regular practice sessions**.

Section 2: Cave Guiding Standards
Level of Guide Experience and Competence

2.1) The guide is completely familiar with the tour route
As a general guideline, a guide should have traveled the tour route through the cave at least three times before leading a group through. A system used by some cave guides is to have the first trip as a familiarization trip, the second as a risk management trip (identifying, evaluating, and managing hazards and risks), and the third trip as an interpretive trip (identifying interesting cave formations and developing the most fun and effective ways to educate the participants about them). Some guides may require more than three training trips before they are comfortable to lead a group through the cave.

2.2) The guide knows the most efficient way back to the surface from any point along the tour route.
Many caves have multiple entrances, some of which are not readily visible. Some entrances are more suitable than others for getting to the surface efficiently in the event of a problem in the cave. The guide should pre-plan the best way to exit the cave from any given point on the tour route.

2.3) The guide is able to administer basic first aid
Ideally, the guide should have a current first aid and CPR certification.

2.4) The guide is able to change the bulbs and batteries in the participant's (and their own) lights.
The guide should be completely familiar with the operation and basic repair (changing batteries and bulbs) of **all** the lights used on the tour.

2.5) The guide has a good knowledge of cave conservation, and demonstrates and conveys this to the cave tour participants.
Actions often speak louder than words. The guide should constantly set an excellent conservation example to the group, and should teach the group how to move through caves with as minimal an impact as possible. *" Take nothing but pictures, leave nothing but footprints along the beaten trail, kill nothing but time."*

2.6) The guide is able to competently supervise and manage the group **at all times**.
Adequate supervision and group management can vastly improve the quality and enjoyment of the caving experience for the participants, and for other cave visitors. It also can reduce the chance that participants, and the cave, will be harmed. The guide must also be competent enough to effectively manage the group in the event of a problem occurring in the cave.

2.7) The guide knows the most effective way to communicate with outside agencies in the event of an emergency.
Some cave entrances are within cell phone coverage, most are not. Pre-plan your communications to work out the best way to summon help if needed.

2.8) The guide is trained and competent in operating any rope systems that are used on the tour.
For tours that descend or ascend vertical pitches where the participants are supported or belayed by rope (other than a handline), the guide must be able to **competently** and **efficiently** perform all the skills taught in the British Columbia Cave Rescue (BCCR) Small-Party Self-Rescue course (see Appendix E).

Section 3: General Information

3.1 Risk Management Principles

Risk can be defined as the potential to lose something, be it physical, emotional, spiritual, or material.

Risk management is a rational process undertaken to deal with risk. It is not necessarily about eliminating risks, but rather about managing and minimizing them. It is also about fulfilling our social responsibilities to carry out our activities with due care and diligence.

Risk Management Techniques

1) Identify Hazards:
- Loose rock, vertical drops, tight passages, cold temperatures, fixed rigging, fatigue, slippery slopes, fast flowing water, flooding from nearby or distant storms, etc.

2) Evaluate the Hazards
Using experience and judgment, evaluate the **probability** and **severity** of the hazards.

Probability: some hazards are more likely to cause harm than others.

Severity: certain hazards have more severe consequences than others.

3) Control the Risks
Aim to manage and minimize the risks to which people are exposed. There are four basic strategies to achieve this:

i**) AVOID** certain risks by not going into some areas (route selection), keeping away from sites of potential rockfall, not entering the cave through a wet entrance, etc.

ii) **MODIFY** certain risks by rigging a handline, removing loose rocks on pitches, etc.

iii) **ACCEPT** certain risks as a part of caving and the adventure experience.

iv) **TRANSFER** certain risks by giving thorough briefings, instructions and demonstrations to the participants, having adequate insurance, having participants sign a professionally drafted and well presented waiver, etc.

4) Constantly Monitor for Changes
Conditions change over time (rocks loosen, floors get wet and slippery with changing seasons, equipment wears and ages, etc). Risk management is a constant, ongoing process. Stay alert, avoid getting complacent, and examine everything with a pro-active, critical attitude.

3.2 Risk Management Notes for Guiding a Cave Tour

Preparation:

- Choose a cave that is suitable for the skill, experience, fitness, equipment, clothing, and time constraints that the group has. Be extremely cautious of caves that have active steams in them, or that are prone to flooding. You must be familiar with drainage patterns, and know how rainfall and melt-water affects the cave.
- If you are doing a 'through-trip', confirm that the cave exit is passable.
- Ideally, choose a cave that can handle visitation without serious impact. Rock floors are best, and single-path routes should be used with care in muddy and sandy caves. A high degree of planning, guide competence, and group management is necessary if you choose a cave where participants will be in close proximity to cave formations (such as stalactites, flowstone, sediment beds, etc).
- The route you choose should be a balance of minimizing impact on the cave, keeping the risks easily manageable, and maximizing the viewing of interesting cave formations for interpretation and education.
- Work out a maximum group size using the guidelines below:
  - The guide should be able to see and talk to the whole group throughout the tour.
  - The group should be able to comfortably fit into any rooms and chambers along the route, and must be able to see demonstrations and hear any information being given.
  - The guide must be able to adequately supervise the group in sensitive parts of the cave (a rule of thumb is that the guide should be able to see the hands of everyone in the group to ensure they're not touching sensitive cave formations).
  -You should also take into account the amount of waiting required for large groups to negotiate a squeeze or a vertical pitch. If in doubt, small groups are much preferred to large groups.
  - For reference, a common guide-to-participant ratio for horizontal caves is 1:7, with the maximum group size being two guides and 14 participants. For vertical caving, groups are generally no larger than 7 participants. Some commercial guiding operations use smaller ratios (1:6, and 1:4 in some cases).
- In preparation for the caving tour, ensure that your basic needs are met (well fed, hydrated, and rested).
- Inspect all equipment and check that it is in good working condition before it is used.
- Double-check that you have all your personal caving and safety equipment.
- Ensure you have met all the Cave Guiding Standards.
- Check that you have all necessary emergency contact information, incident report forms, client medical information, and emergency response documents.

At the trailhead:

- Check participants for appropriate clothing and footwear.
- Encourage everyone to use the washroom (if available). For hygiene and pollution reasons, avoid letting your group go to the toilet around the cave entrance. **Do not let anyone in the group go to the toilet in the cave unless it can be carried out in a suitable, airtight container.** Plan ahead.
- Brief participants as to what is involved in the tour. Participants should know what they are getting into, and what is expected of them.
- Check for any medical conditions, and remind people to bring any medications they may need with them.
- Set any rules in a clear and concise manner, and consistently enforce them.
- Maintain effective group management at all times.

- Count the number of people in your group.

On the trail to the cave:

- Assess the participant's fitness and agility levels (and assess their ability to follow instructions) and be prepared to adjust the tour accordingly
- Constantly watch for hazards, such as hanging branches, loose rocks, holes in the trail, slippery sections, etc, and manage them appropriately.
- If possible, take another washroom stop **before** you are near the entrance

At the cave entrance:

- Encourage participants to leave excess gear (heavy jackets, waterbottles, backpacks, etc) outside the cave. Aim to have the participants adequately dressed and equipped, but carrying as little as possible **with both hands free**.
- Discuss the importance of moving in a slow, balanced manner. Encourage participants to keep low and "move like a crab" if they feel unsteady. Avoid running or jumping in the cave.
- Check that everyone's helmet (and any other equipment) is correctly fitted, and that everyone's lights are on and working before entering the cave.
- Encourage all members of the group to support each other as a team to protect the cave and each other throughout the tour.
- Assess the ability and temperament of group members and ask the most apparently competent and suitable individual to bring up the rear of the group.

In the cave:

- Gather the group for a few minutes beyond the 'twilight zone' to allow everyone's eyes to adjust.
- Count the number of people in the group again.
- Manage the group carefully in the cave. **Spend the majority of your time looking back at the group** and checking that everyone is on the correct route, is traveling competently, and that everyone's lights are working well.
- When stopping the group, choose stable areas away from any potential rockfall. Where possible, have the group sit down when they stop, especially if they are looking upwards at cave features. People are a lot more balanced when sitting.
- Pre-warn participants of any hazards (low ceiling, holes in the floor, etc) even if they seem obvious to you.
- Demonstrate any specific techniques (climbing, handline technique, etc) **before** the group needs them. Plan ahead.
- Be aware of coercing participants. Plan ahead so you can effectively deal with anyone who wants to leave the cave or doesn't want to do certain sections of the cave. Avoid leaving anyone alone in the cave.
- Be aware of sexual harassment issues if you are physically assisting someone. Ask their permission first. The lowest-risk place to hold onto people is by grasping them by their clothing, between the shoulder blades. (On that note, if you are giving someone a 'hand', gripping wrist-to-wrist is usually more secure than hand-to-hand)
- If participants are leading the group through any sections of the cave, ensure they have clear instructions to keep the group together, and ensure that they know where to go and where or when to stop.
- If participants are climbing short sections where a rope is not needed, it is prudent that the guide be in a position to 'spot' a fall. The aim of 'spotting' is not to catch someone who's falling, but rather to 'guide' their fall and to try and ensure that they land softly, feet first, with their head and shoulders protected. 'Spotting' should only be used in

places where there is both a low probability and severity of a fall. **If a fall is probable, and/or has severe consequences, then fall protection should be used**. (Note: fall protection should not be reliant on the person maintaining a grip to prevent a fall. A handline alone is not considered to be fall protection. A securely anchored and competently used belay rope, or a prusik or ascender attached via the participant's harness to a securely anchored handline, are suitable examples of fall protection.)

Outside the cave:

- Instruct participants to leave their helmets on until they are clear of any potential rockfall sites (particularly around the cave entrance).
- Maintain effective group management.
- Count everyone in the group to ensure all are present and out of the cave.
- Request that the group move away from the vicinity of the entrance before relieving themselves, or to use washrooms if they are present.

*Note: Experienced guides will maintain high levels of risk management on their tours, but usually in a subtle, unobtrusive way. This 'behind-the-scenes" approach allows participants to focus on enjoying the cave, and avoids the 'safety-sergeant' atmosphere. Find the tone that you think is appropriate for the situation.

3.3 Interpretive and Teaching Skills

"*The mediocre teacher tells. The good teacher explains. The superior teacher demonstrates. The great teacher inspires."*

- William Arthur Ward

Guiding is a skill that, like any other, requires constant practice and evaluation.
All guides should have a good knowledge of the area they work in, including topics such as geology, glaciation, botany and ecology, cave formation, cave history, and local history.
Guides should be very aware of the environmental impacts of their tours, and seek to minimize them.
Enjoy guiding, know your subject matter, and make caving a fun, well managed, and inspiring experience for the participants and yourself.

Below are some ideas to help make your guiding as effective as possible. Some points are more relevant to guiding school-aged groups, other points are more general.

Preparation

- Be appropriately dressed and equipped, adequately fed and hydrated, and display a positive, focused attitude.
- Be up-to-date with current guiding practices, and group considerations (time constraints, special needs, etc).
- If possible,arrive early and get all equipment organized well in advance.
- Know the tour route and interpretive points thoroughly, and have as great a depth of knowledge about caves and caving as possible.
- Take a moment to *visualize* yourself running the perfect tour.
- Anticipate any group dynamics that you may need to address (e.g. tired kids).

1st Five Minutes

- Be enthusiastic, interesting, confident, decisive, and in-control.
- Introduce yourself.
- If needed, set and maintain standards of behaviour, and be consistent with enforcement. Create an atmosphere where 'rules' are seen as helping to minimize harm and to keep everyone happy.
- Engage the group's attention and build on it.
- Address any negative group dynamics.
- Learn names as quickly as possible. This builds respect, makes the participants feel important, and is a crucial tool in group management.
- Treat everyone with a respectful, caring attitude. Avoid favoritism.

During the tour

- Project your voice to the back of the group.
- Vary your tone of voice (be enthusiastic about what you're saying).
- Maintain roving eye contact, don't just look at whoever appears the most interested.
- Avoid shining your headlamp in people's eyes. Use a low-powered light, point it downwards, or turn it off when speaking to the group.
- Carefully choose where you stand to address the group. Ensure everyone can see and hear, and that they are as comfortable as possible (not unsteady, or getting cold and wet backsides or feet). You may need to direct people where to sit, and 'package' the group into small areas.

- Be aware of your mannerisms and body language.
- Alter your delivery to suit the group. Simplify to the main concepts with young students, give interested participants as much as possible.
- Plan and deliver your session to incorporate as many senses as possible, including a sense of humour! Engage the students' vision, hearing, touch, taste, and smell as much as possible. Reduce the amount of talking you do as much as possible. Think "student-centred learning". Try to teach by involving the participants through all their senses.
- Most people will want to touch the calcite formations. Having a small 'sacrificial' piece available at the start of the tour for participants to hold and feel may satisfy their needs and lessen the chances of someone wanting to touch a delicate formation later on.

Ways people learn:

We Remember:
20% of what we **read**
30% of what we **hear**
40% of what we **see**
50% of what we **say**
60% of what we **do**
90% of what we **read, hear, see, say, do**

The **Left Side** of the brain is for logical reasoning, analysis, linear thinking, math, language, rational thought. (Formal schooling favours left brain thinking).
The **Right Side** of the brain is for creativity, emotions, intuition, imagination, rhythm.
Try to engage both sides of the brain when interpreting.

Questioning

An effective way to evaluate whether students are learning is by asking them questions. This also keeps them involved and alert, but some types of questions can be more effective than others.
- **Closed Questions**, often starting with 'is, was, are' usually only require one-word answers and do not invite discussion. "Was that fun? Is that clear? Do you understand me?". Closed questions often do not give a true indication of student understanding and comprehension levels.
- **Open Questions**, often starting with "why, what, how, when, where" require critical thinking and multiple words to answer. "Why did that happen? What do you feel? Where do you think this water comes from?". Open questions may require students to demonstrate their knowledge, and are often very useful for evaluating how effectively students are learning.
- **Leading Questions** direct students into giving a certain answer. Asking "how did you enjoy the tour?" creates the expectation that the students actually did enjoy the tour, and they may feel obliged to answer accordingly. Leading questions may be used to help groups who are struggling to answer a question, but often sets up a "guess what's in the guide's head" type atmosphere. Try to be critically aware of the effects of asking leading questions.

Asking questions puts people at risk of appearing stupid in front of peers. Below are some hints to encourage questions and responses from your group.

-School groups will often automatically ask questions, but you may wish to gently remind adult groups to ask plenty of questions.
- Establish the expectation that every one of your questions requires a response from the students.

- Responding to all questions and responses (especially incorrect responses) in a positive, encouraging manner will help the group feel comfortable to ask and answer more questions.
-Adults are often uncomfortable answering questions in a newly-formed group. Begin with easy, non-technical questions, and don't push the group too hard for answers at the start.
- Some school groups can ask lots of questions. Keep them on topic, and limit questions if necessary ("Okay, two more questions, then we'll move on").
- Use the group's time efficiently. Some questions benefit the whole group, others are in one person's interest. Try to answer personal interest questions while the group is engaged in something else (e.g. walking to next interpretive stop, or practising a skill).
- Use *wait times* to elicit answers from your group if you feel they need to be challenged. Often when we ask a question, if we get no response in 2-3 seconds we start to feel uncomfortable with the silence so we will rephrase the question or give the answer. Research has shown that if you wait more than 3 seconds, responses from the group can increase by over 400%. The quality of responses also improves. If you ask a question and wait long enough, eventually someone will respond. This technique can be used to 'push' groups who you feel know the answer but are not contributing (often teenage groups). Be cautious not to overuse wait-times, as the group can become frustrated at being 'pushed' to answer. Try other methods to spark their interest and motivation.
- You can enhance students' listening and attentiveness habits by not repeating questions or responses.
- Avoid answering your own questions if you do not get an immediate response.
- Aim to involve everyone in the group in answering questions, not just the most interested students. One technique is to ask the question, pause, and then call on an individual to answer. For shy, reluctant, or inattentive students, it is often helpful to call their name first, and then ask the question.

Teachable Moments

These are unplanned events which can provide a valuable learning experience for the group.
- Try to turn a distraction into a quick lesson.
- Listen to your group. They may see something of interest that you can engage them with.
- Look for group dynamics and behaviours that can provide useful lessons.

Evaluation

"*If the learner hasn't learnt, the teacher hasn't taught effectively*"

- Analyze your own guiding at the end of every tour. What went well? What could be improved? How can you do things more effectively?
-Actively seek peer feedback from other guides. When receiving feedback, do not argue or try to defend your actions, simply accept <u>all</u> feedback with a 'Thankyou" and then process the information yourself. Do not be threatened by criticism, use it to improve.
- Ask your peers to suggest or demonstrate interpretation techniques that work particularly well for them.

3.4 Guide Professionalism

As a guide, you are expected to work to high standards. Professionalism extends beyond 'on-the-job' time; it includes your preparation and post-activity actions as well.

Preparation

- Allow enough time to prepare before your work commences.
- Be adequately fed and hydrated.
- Wear (or carry) appropriate clothing for the conditions you may encounter on the trip.
- Ensure equipment is organized and in good repair.
- Exhibit a focused and positive attitude. Many participants have gone to great lengths and expense to be on the trip, and have high expectations. Be ready to provide them with an exceptional experience every time.
- Have a thorough working knowledge of the job. Do you need more observation time, feedback, or training?

On-The-Job

- Operate to the level you have been trained to.
- Maintain flexibility to deal with last minute changes.
- When working with another instructor / guide, pre-plan roles and distribute the workload appropriately.
- You are a role model for kids, other staff, volunteers, and adults. Set an excellent example.
- Avoid placing yourself in a situation where sexual-harassment allegations can be made.
- Handle all situations in a calm, confident, and efficient manner.
- Don't allow pressure from clients to influence your adherence to risk management and approved practices.

With clients and the public

- Be polite, interested, and non-confrontational in all dealings with the public.
- First impressions count. Be punctual and organized.
- Make eye contact as you talk to people. Remove sunglasses.
- Project your voice to all participants when addressing a group.
- Be aware of mannerisms or body language that may distract clients (seek peer feedback).
- Show concern for participant comfort (cold hands, rest stops, washroom stops, etc).
- Adjust your presentation style to suit the group.
- Be firm and consistent in enforcing rules and guidelines.
- Thoroughly brief assistant guides as to their roles and responsibilities.
- Deal with distractions in a positive manner; use them as 'teachable moments' if possible.
- Be sensitive to client limitations, fears, and concerns. Address these in a positive, caring and reasonable way.
- Be sensitive to participants' beliefs, opinions, and backgrounds. Do not be judgmental.
- Minimize the group's impact on the environment as much as possible.
- Avoid discussing work issues or after-hours plans in hearing range of the public.

Post-activity

- Store gear correctly, arrange for damaged gear to be repaired.
- Arrange for resupply **before** you run out of an item.
- Avoid leaving easily-removed equipment unattended in public.
- Attend to jobs as soon as you can, don't expect someone else to do them. Set a deadline and make time.
- Debrief your tours:

- Come with a proactive attitude, and be willing to learn and improve
- Seek solutions to problems
- Be willing to share your mistakes and experiences so others can benefit.
- Be open to new ideas, improvements, and feedback.
- Implement any agreed-upon changes.
- Critically analyze the programs you offer and seek improvements.
- Communicate with others in a positive manner.

3.5 Cave Conservation

Minimum Impact Caving

From the British Columbia Speleological Federation "Caving Codes of Conduct":

* Consult with prior visitors about sensitive features. (This may also reduce the need for redundant visits.)
* Limit the size of the party to the minimum required for a safe visit. (Four is a reasonable lower limit.)
* Use a good source of light. (Avoid using acetylene-based headlamps in confined delicate areas.)
* Use suitable protective clothing.
* Don't smoke or make fires (even at the entrance).
* Stay on the established "minimum impact" route if already established, and avoid touching anything.
* Never break or soil speleothems (including flowstone and moonmilk).
* Don't "push" delicate passages.
* Don't overuse sensitive caves or sensitive interior passages.
* Never mark surfaces.
* Don't discard anything. (Remove all modern discarded objects, even if you were not responsible for putting them there!)
* Don't urinate or defecate inside the cave. (Carry out all human waste in the case of bivouac).
* Don't disturb hibernating bats or other sensitive organisms.
* Avoid altering natural air or water flows.
* Improve personal technique and abilities rather than permanently modifying the cave.
* Use bolts only as a last resort where natural or non-marking anchors (cams, chocks, etc.) cannot be used.
* Place bolts or other permanent fixtures only after thoughtful consultation with the broader caving community, particularly other persons familiar with the cave.
* Use only high-quality bolts, and tag all bolts with the date of installation
* Avoid the use of explosives.
* Avoid disturbing unique or unusual sediment accumulations.

From the National Speleological Society:

* Caves have unique scientific, recreational, and scenic values
* These values are endangered by both carelessness and intentional vandalism
* These values, once gone, cannot be recovered
* The responsibility for protecting caves must be formed by those who study and enjoy them.

Accordingly, the intention of the Society is to work for the preservation of caves with a realistic policy supported by effective programs for: the encouragement of self-discipline among cavers; education and research concerning the causes and prevention of cave damage; and special projects, including cooperation with other groups similarly dedicated to the conservation of natural areas. Specifically:

All contents of a cave -- formations, life, and loose deposits -- are significant for their enjoyment and interpretation. Therefore, caving parties should leave a cave as they find it. They should provide means for the removal of waste; and, especially, exercise extreme care

not to accidentally break or soil formations, disturb life forms or unnecessarily increase the number of disfiguring paths through an area.

Scientific collection is professional, selective, and minimal. The collecting of mineral or biological material for display purposes, including previously broken or dead specimens, is never justified, as it encourages others to collect and destroy the cave.
" Take nothing but pictures, leave nothing but footprints along the beaten trail, kill nothing but time."

3.6 Guide Training and Resources

There is no standard training for cave guides in western Canada. Most commercial cave guiding operations train their guides 'in-house' for the specific caves they guide through. The standards of training are usually set by the guiding company, and the land manager (if applicable). Trainee guides are generally expected to have a valid first aid and CPR certificate, and prior caving experience.
Technical guides, who run tours that require vertical ropework, and who access deeper sections of caves, usually have current Wilderness First Aid certification (or equivalent). These guides are generally trained and competent in anchor selection and rigging, climbing, rappelling, belaying, and Single Rope Techniques (SRT) suitable for caving. It is standard amongst the cave-guiding industry that such guides be trained and **competent** in small-party self-rescue techniques for caving (see appendix E).

Cave Rescue training is provided by:
British Columbia Cave Rescue (BCCR) http://www.cancaver.ca/bccr/
Contact Phil Whitfield at (250) 372-5079 for details.

Alberta Cave Rescue Organization (ACRO) http://www.cave-rescue.ab.ca/
Contact John Chaychuck at (403) 274-8424 for details.

Both organizations work closely with each other, and offer regular courses.

Cave-related resources on the Internet

Canadian Caver: http://www.cancaver.ca/

British Columbia Speleological Federation (BCSF): http://www.cancaver.ca/bcsf/

Alberta Speleological Society (ASS): http://www.caving.ab.ca/

The National Speleological Society (NSS) in the United States: http://www.caves.org/

The National Caving Association (NCA) in the U.K: web.ukonline.co.uk/nca/

The Australian Speleological Federation (ASF): http://www.caves.org.au/

The New Zealand Speleological Society (NZSS): http://www.massey.ac.nz/~sglasgow/nzss/

Also, web pages such as "Speleolink" and "Virtual Cave" are excellent resources.

Appendix A

"Don't forget the guide"
- observations on developing a culture of excellence in visitor experience

- John Dunkley

A couple of years ago the Jenolan Caves Reserve Trust engaged me to advise them on training programs for guides. A large part of their training resources on history consisted of a list of over 150 events and dates with no associative link enabling guides or visitors to place the events in a meaningful historical context. The similar remaining material in a hefty tome filled a useful role as a reference source. Unfortunately, however, it was being used as a training manual. But what's the point of having the world's most knowledgeable guide if the guests don't get a great experience? There was too much emphasis on what was put into the training process and not enough on what the outcome was.

Surely, I thought, there must be a better way. These notes are based on my report, but the sections dealing with providing appropriate training have been excised. The notes are also based on my work at Jenolan, but have wider applicability, because what we're dealing with here is human psychology.

My main message is that sometimes the cave itself makes the tour a memorable experience, more often it is the guide, and that in a total interpretation package, the guide is the critical factor.

Egypt

Some years ago my wife and I toured Egypt on an individual package which provided for 'meet-and-greet' facilities at airports, our own personal tour guide service in Cairo, Luxor and Aswan, and a tour boat cruise down the Nile. The guides were immensely knowledgeable and openly proud about the history and geography of their country and the archaeological and architectural treasures of the Cairo Museum, Giza and the Nile Valley. They had an answer for every conceivable question, and I heard people ask the most obscure and esoteric ones.

Obviously one could scarcely visit such sites without expecting a steady flow of information. Yet the ear hears what the guide is saying, the brain integrates it with what the eyes see and *may* form a pattern of understanding and appreciation, but somehow it is still not retained. Frankly, I can scarcely remember a word or a fact that they transmitted. What I do remember is a holistic appreciation of the achievements of the culture of ancient Egypt, the uncompromisingly high standard of service we obtained, even at a chaotic airport at 4am, the unfailing civility with which it was delivered, the educated and even scholarly fluency of knowledge transmitted, the grace with which those esoteric and downright inane questions were fielded, and the ability to know when a customer wanted to be let alone to appreciate, to let the senses drink it all in.

Of course, all this might be put down to expectations. Egypt is a third-world country, so there's unexpected pleasure in receiving first class service. Or perhaps Australians are not used to receiving first class service even if they pay for it. Or perhaps they don't even know what excellence in customer service really involves.

Chartres

Then on Easter Saturday a few years ago we visited the great medieval cathedral at Chartres near Paris. We joined a small group, maybe 10 or 15 of us, guided by an Englishman who had completed a PhD study of the iconography of the cathedral in 1956. He had lived in Chartres for 40 years and this was his life's work. Nearly every day for those 40 years he shepherded one, sometimes two or three groups of pilgrims around the same stained glass windows, the same flying buttresses, the same gargoyles covered by pigeon droppings. When we started they all looked the same to me. Not when we finished. Every window and every gargoyle had a story to tell. The guide picked out two or three, the explanation was interwoven with medieval interpretations of biblical history, and somehow I felt transported back 800 years. Offhand I don't remember what any one of them was about (although the guidebook could jog my memory, and this is an important point). But I do remember why the cathedral was there and not in the next little town, what its significance was, and its place in the social fabric of the Middle Ages. And it was truly a revelation; an experience which left us deeply, impressed, filled with new insights, wanting to know more some time.

It could have been so boring, as dry as the pigeon droppings on the gargoyles. And indeed it would have been if the guide had merely recited the names of forgettable characters on the stained glass, or the chronology of passing bishops, or tried to explain the meaning of each and every window and gargoyle. But he was highly selective in his interpretation. And he had so much more to offer – he had the passion, he brought it alive, he put the detail in a wider

context, he explained the context rather than the trivia.

And yet I've seen plenty of cathedrals over the years – Westminster, St Pauls, St Peters, Cologne, Toledo, Notre Dame de Paris. It could have been a case of 'seen one cathedral you've seen them all'. We only went to Chartres because it sounded like a nice place to go for the day. But Chartres was the one I will remember, because of that guide. And because of that guide, I can put the others in a context and understand so much more about the history of medieval Europe. Can we aim at the same outcomes for cave inspections?

Caves – what kind of interpretation?

So, to get to caves. The most impressive show caves I have ever seen are Jeita in Lebanon, Skocjan in Slovenia, and the well-known Carlsbad Caverns in New Mexico. *In all three the guide effectively provided no interpretation to many visitors.* The first two did not offer English-language tours, while Carlsbad is self-guided and self-paced although guides are stationed at intervals to allow interaction. So what was so special about them? Well, they simply overwhelmed the senses. You walk through these caves almost transported. There was something new, something unexpected, something revealed and something learned at every bend.

Han Cave, Belgium

Two years ago I had a look at Han-sur-Lesse Cave in Belgium, an excellent tour offering a variety of cave experiences, though rather mass-produced. Here some of the visitor experience lies in the journey to and out of the cave. You arrive by tram, walk through the cave, and exit by boat. The guide was knowledgeable, passionate and committed, just like most guides I know in Australia. He was overwhelmed when I remained to talk about the cave. Indeed, he asked me over to his place for lunch and it turned out he'd once visited Jenolan. As in the previous case, I wondered what customers remembered of the tour.

One thing was different, though. Casual dress. The guide did not wear a uniform and I suspect this informality made a difference to the visitor experience. Why has no one questioned the wearing of uniforms by guides in Australia?

Soreq Cave, Israel

Here visitors first watched a 10-minute video near the cave entrance, available in several languages. This placed the historical heritage of the area in context (it was in Judea), covered the geological development and significance of the cave, and included a brief video tour of the forthcoming inspection highlights. The guide didn't say much, and that was in Hebrew anyway. But he didn't need to – the overall interpretation package did that, and the cave then spoke for itself. A small visitor centre at the exit added to the total experience. The cave was small and attractive but not outstanding – certainly it provided a contrast with the desert above. Yet it was memorable because the interpretation strategy, and presumably guide training, had taken into account not only the language problem but also some elementary psychology of learning involving a variety of delivery modes.

Arizona

A tourist cave near Tucson, Arizona provided a contrast. Sounding as though he had learnt it by rote, the guide had a standard patter related almost entirely to legend and mythology (which, admittedly, was all the cave had going for itself!). At the end the other visitors disappeared rapidly. When we lingered to ask questions and talk the guide seemed genuinely surprised and pleased that any visitor would actually be interested in his cave, as though meaningful interaction with customers was something extraordinary.

Guiding and interpretation as learning processes

Not every cave can be like Carlsbad. My message is that if the cave itself can't maximise the experience, the guide has to. Her job is to transform guests' expectations into a really memorable experience. A really successful learning experience is *transformational.* It doesn't just add to our understanding or perception, it positively transforms it, challenging our established pattern of thinking. As one Jenolan guide I spoke to put it:

"The chief aim of interpretation is not instruction, but provocation …interpretation is a revelation based on information. All interpretation includes information but they are entirely different processes".

This can happen when the experience is unexpected, when what is learnt is a true revelation. An analogy can be drawn with movies. There are feel-good movies with formulaic plots and predictable endings which make us feel good because, let's face it, that's what we expected when we went to see it. Then there are films, which cause us to leave thinking *"what was that really all about?", "was there another interpretation, which I sensed but didn't quite grasp hold of"?* Why, after all, do people go to see the same movie twice or three times? Presumably because there was some quality in it that they wanted to relive, to place another interpretation on, to find some hidden meaning in.

I wonder whether one of the barriers to really successful, transformational interpretation and guiding is that tour groups are not sufficiently

challenged. When paying their money people have an expectation of the kind of guiding they will receive, which on the whole, they recall from previous experience, is decidedly passive. *Because* they paid their money and this *is* their expectation, and because we want to make them feel they've received their money's worth, is there a tendency for guides to provide them with just that expectation, albeit livened up with some individual approaches, rather than seeking to maximise their experience?

Interpretation is a learning process. It has less to do with telling and more with having people work things out, question what they see, feel or hear, with being challenged and enriched by the experience. More of our training needs to be redirected towards encouraging this rather than transmitting ever more factual information. As another Jenolan guide observed:

"For me the essence of the job is being able to weave an extraordinary experience for the visitor from the wealth of information at your disposal and from the environment in which you encounter the visitor. The information could be historical, prehistorical, geological, mythological, fantasy etc. The environment will vary from cave to cave, group to group, person to person. At the end of the day the visitors want to have enriched themselves and have had a damn good time".

What do visitors remember of their cave tour?

In general, learning psychology tells us that we remember more from doing things than from being told about them. An hour later, most cave visitors will remember as little as 5% of what you tell them, if that's the way you deliver it, perhaps more if you provide a variety of stimuli and time for reflection and reinforcement

Teachers have traditionally been criticised for talking too much, and there is plenty of evidence showing that it is largely counter-productive. The same could be said of tour guiding. *The paradigm of guide-as-expert, a transmitter of knowledge as such, must go.* This is not to say that guides should not be expert practitioners, rather that they should exercise sound judgment in how to *use and adapt* their knowledge and skills in interpretation. *Enthusiasm and creativity in delivery are far more effective than passive delivery of masses of information.*

Interpretation therefore has to take into account variations in individual people's preferred learning style, and be presented in a variety of ways, which challenge the senses.

Fantasy, entertainment or science lesson?

Some criticism has been made that guiding and interpretation have moved too far away from fantasy and entertainment towards a diluted science lesson. There is no reason why interpretation cannot be fun and entertaining if that mode delivers the outcomes discussed above. Once again, this is an example of focusing too narrowly on the *inputs* to the process of interpretation, rather than on the *outcomes* of visitors' experiences.

Some guides have reduced a dependency on talking by using props such as music, singing, and even mundane objects like torches and flashguns, and there is scope for drama and improvisation. These innovations introduce an element of surprise into conventional tours, adding entertainment to education, and they deserve commendation. They have certainly greatly improved visitor experiences. However more innovation is needed to move away from the foundation on which they are built – the concept of the traditional inspection of one of the named caves.

Expecting the unexpected

(In the next sections some comments may have to be adapted to meet the needs of visitors to smaller cave parks).

Although innovatory theme tours have been developed with notable success in many areas, too many cave inspections remain just that: inspections of named caves. A Holden with all the bells and whistles is still a Holden. A tour of the Imperial Cave is still a tour of the Imperial Cave. A few traditional features may have been omitted to shorten tour times, but the product is often much the same. A standard fare is offered – the same cave tour at the same time on any particular day. Why? What is driving the decision – managerial convenience and predictability, or maximising visitor experience?

Certainly some tours have to be guaranteed to meet the needs of coach schedules, and the need to provide for peak loads may narrow the possible offerings. However the rationale for general adoption of this practice has to be questioned.

I challenge the response that this is what visitors expect. *There is a significant difference between meeting visitor expectations, and maximising the quality of their experience*. Visitors may well expect the present arrangements because that is what they have learnt from experience to expect, not because it is the best way of organising tours to maximise the quality of their experience.

A paradigm shift to bring this about demands a corresponding change in promotional and advertising strategies. Marketing strategies could be adopted to promote more experiences in which visitors would be invited to step outside their comfort zone, and expect the unexpected.

Innovatory cave tours

A successful tour has already been developed around ghost stories of Jenolan, and the activities and discoveries of cave divers are highlighted on others. An entire tour could be woven around Jeremiah Wilson's motivations and sycophancies. A tour concentrating on aboriginal perspectives relating to the caves could be devised. As noted above, some of the world's best cave experiences occur where the guide says very little. Why not a cave tour, with questions and suggestions implanted in visitors' minds at the beginning of the tour (by video?) and maybe discussed on the way out, but silent inside the cave?

The nomenclature of many cave tours is less than inspiring. Just as the Plughole markets better than Elder Cave, perhaps consideration should be given to more enticing or descriptive names for some tours. The "Waters of Jenolan" tour provides a lead. How about "Following the Explorers Trail", perhaps. Or "The Wizard of Jenolan" based on Nuri Mass's book?

Interpreting the history of Jenolan

The historical record of Jenolan Caves has been described as being like a microcosm or a slice through Australian history. There are themes related to the aboriginal dreamtime, to the convict era (Whalans), bushranging (perhaps!), pioneering individualism (Wilson), the taming and transformation of rural Australia, and to the concomitant growth of bureaucracy and middle-class affluence just on a century ago. There is a strong strain of the legendary folkloric hero. There is the neglect and complacency related to wars and depression, the rise of environmental awareness, even to the era of economic rationalism & divestment of government assets.

Unfortunately this element of social history does not appear to be part of the training resources presently available. A teacher would be very critical of the treatment of history in the current "Training Manual" mentioned above, which does no more than list over 150 events and dates with no associative link enabling guides or visitors to place the events in a meaningful historical context. It is a long time since history was about dates and chaps.

To appreciate more fully the tapestry of Jenolan history, visitors need associative links between events at the caves, and events or periods with which they can identify.

Does it add to the visitor experience to be told who discovered the Imperial Cave, and when? Does it matter whether it was Wilson or Cambridge? Why do visitors need to be told the often-obscure names given to particular decorations? Are there not ways of savouring the splendour of Commonwealth Dome without knowing its name or origin?

There is something about educators and guides that impels them to justify their role by talking. If a move away from traditional guiding is to take place, and visitors' experience is to be maximised, the urge to convey masses of interesting but largely irrelevant information should be abandoned.

Vast amounts of money are spent on hardening walkways, improving lighting systems and on visitors' centres. But visitors may remember even the most ordinary cave, especially if it's the first or only one they visit. But if it's a truly memorable experience that they want or that you would like them to have, it's the guide that makes the difference. Don't forget the guide.

Aiming at Excellence - A Checklist

If you're a guide

Aim at:

- *Maximising the experience, not merely meeting expectations*
- *Interacting rather than informing*
- *Transforming rather than informing*
- *Explaining the context rather than reciting the trivia*
- *Resisting the urge to talk too much*

If you're a manager:
Encourage and reward diversity in interpretation

Consider an interpretation package rather than a simple in-out cave tour, especially for guests with limited English(e.g. video –>cave inspection –> time for questions / discussion ->visitor centre)

Focus on what guests get out of the experience rather than the resources (physical & human) which you put into it.

Get away from the mundane – promote and interpret the things, which are different about your cave (every cave has stalactites & stalagmites - surely everyone knows about them by now?)

Distinguish between a reference or resource manual, and a training program

If your guides wear uniforms, ask yourself why

Remember, it is the guide that makes the difference

DEVELOPING A CULTURE OF EXCELLENCE IN VISITOR EXPERIENCE

FROM this:	TO this:
The cave tour is: the same as it was yesterday based on transmission of knowledge (i.e. *cognitive* dimension) a diluted science *lesson* an *informational* experience	*The cave tour is:* different every time based on enthusiasm, stimulation & creativity (i.e. *affective* dimension) a *memorable experience* a *transformational* experience
The guide: has a fund of knowledge which she exhausts on every tour is an 'expert' so he has an answer for everything *informs* people *talks* a lot makes *closed* statements e.g. "this stalactite is 50,000 years old" *meets* customers' expectations	*The guide:* has a fund of knowledge which she draws upon as appropriate admits to ignorance & invites visitor to guides' office to check answer *interacts* with people talks less, but makes every word count includes *open-ended questions and statements* e.g. "I wonder why …", "How do you think this happened?", "how could we work out how old this stalactite is"? *maximises* customers' experience (i.e. gives them more than expected)
The visitors: listen or react passively	*The visitors:* are challenged, have their imaginations activated, go away wondering
Historical interpretation: is a list of dates and discoveries	*Historical interpretation:* associates with periods (not dates) with which people can relate e.g. *"when this district was first settled", "when SA was still a British colony", "in the time of your grandparents"*

Appendix B

Best Practice in Visitor Management

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Introduction

The term 'Best Practice', or even 'World's Best Practice', has become the latest buzzword of industry. Often, it is clearly just a lot of hype to try and convince us that the same old mediocrity has been magically changed by using the right words. People are rightly beginning to be very suspicious and even contemptuous of the term.

However, we use it in our title for good or bad, simply because there is a real possibility that it might lead to better practice if we really confront the quality issues. David Weston (1996) of Parks Victoria recently argued that World Best Practice is a 'goal out on the horizon'. This expresses the notion that best practice is not the current operation of any organisation, nor is it a product, but rather it is a process which leads to continual enhancement of standards.

Thus, a number of the practices which we will reject in the course of this paper are ones which various or all of us have supported or used in earlier years. But we have learned from those mistakes, and from the mistakes of others (which are, of course, much easier to see) and so have embarked on the search for 'best practice'. It is now clear that much of what has been done in the past cannot be tolerated if we are to strive for 'best practice.' We trust that our efforts will inspire others to become more creatively and positively critical of standards in everyday practice.

Further, we emphasise that our principles are intended as a basis for discussion; certainly not as a prescription. We may have overlooked some very important issues, or we may simply have it wrong. But most importantly, the movement towards best practice demands industry involvement and agreement. We hope that people will take the challenge very seriously and look firstly at ways in which each cave area can achieve best practice in the way which is just right for the setting concerned, and only secondly at how this can be translated into industry-wide principles.

Basic Assumptions

In any discussion of best practice, it is important to spell out one's basic assumptions about the context of practice.

Let us start with karst itself. Rolan Eberhard (1996, p.8) provides a particularly neat description in saying that karst is an integrated and dynamic system of '. . . component landforms as well as life, energy, water, gases, soils and bedrock.' Note in particular that he includes life — which obviously includes human beings — and that he also includes those things which are, at least in part, the products of life — energy, water and gases.

This notion also directs our attention to some of the things which we do not normally notice, or even recognise. It leads to the inescapable conclusion that part of good practice in visitor management must be maintaining the dynamic balance of life and its products in the karst environment.

Visitors are usually concentrated in one component of the karst landforms — the caves. So we need to next consider some of our assumptions about caves. Here we draw upon the very valuable statements from Gillieson (1996, pp.4-5) which set an appropriate baseline:

First, that caves are a measure of the intensity and persistence of the karst process . . .

Secondly, that caves tend to integrate both surface and underground geomorphic processes . . .

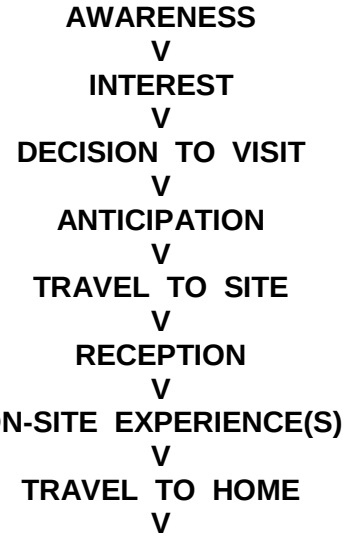
Thirdly that once these products of surface and underground processes enter the cave system, they are likely to be preserved with minimal alteration for tens of millennia, perhaps even millions of years.

Thus, caves can be regarded as natural museums in which evidence of past climate, past geomorphic processes, past vegetation, past animals and past people will be found by those who are persistent and know how to read the pages of the earth history displayed for them.

Again, visitor management must pay proper regard to the protective functions of cave management, and further, must recognise the displayed features of earth history so that they may be appropriately presented and interpreted to those visitors who are interested.

Shaping Visitor Experience

Before entering into practical details, we need to also discuss the very basics of the way in which any visitor experience is shaped. This involves a complex of factors, all of which must be located within the so-called trip cycle. This can be detailed in a range of ways, but includes at least the stages listed in Figure 1 below.



RECOLLECTION
V
REFLECTION

Fig. 1 : The Trip Cycle

As we deal further with the actual detail of management, we will return to this cycle and deal with it stage by stage. But even at this point, let us emphasise the importance of such factors as awareness, anticipation, reception (arrival) and recollection. Any one of these may well be more important than the experience itself, and of course, it is the recollection which counts most to the visitor in the long run. Do we give enough attention to ensuring that every visitor receives a memorable rather than a routine experience?

Of course, the cave managers are not solely responsible for the quality of the experience. In Fig. 2, we introduce a way of considering a cave visit, based upon a model for understanding any recreational experience developed by one of us (Hamilton-Smith 1994, p.80). This argues that there are five key sets of variables which enter into shaping the experience and its outcomes:

• opportunities and constraints which are brought to the experience by the visitor
• time-space location
(neither of which can be shaped or altered by cave managers)

• physical environment of the cave park
• social environment
• program and activities of the visit
(all three of which can be shaped or influenced by cave managers)

Finally in this prelude, we have to ask the question of 'Who are the Visitors?' It seems to us that common cave management practice only really recognises 3 categories of visitors: cavers, wild cave tourists and tourists. Some might even be sophisticated enough to recognise bus tourists as different from FIT tourists. But the fact is that most tourist visitors are lumped together in standard routine tours and other than some individual attention from the better guides, no real consideration is given to the remarkable heterogeneity of tourists.

To integrate this discussion, we suggest that cave managers have a wide range of responsibilities, but pre-eminent amongst these are

• proper stewardship and preservation of the caves resource
• safety of the visitors (there is no point in a good experience if it is also terminal!)
• quality experience for all visitors

We now turn to suggesting some practical guidelines.

Towards Better Practice

AWARENESS AND INTEREST

Obviously any better practice must commence near the top of the trip cycle with the public information and marketing program. There are at least two principles which should be applied here. If these are applied properly, particularly with an eye to specific population segments, we well may also help to shape the decision to visit (and with whom people choose to visit) and the anticipation of the visit.

1. The information made available to the public should be accurate, but also should not convey a misleading impression, no matter how accurate.

Probably photographs are the element most often at fault; they all too often imply silent contemplation of a particularly beautiful scene, presented far more dramatically and effectively than is in fact the reality. In other words, they are all too likely to build an anticipation which will not be fulfilled by the visit, even though the portrayal is accurate. Similarly, slogans may well exaggerate some aspects of a cave beyond what visitors will experience.

Wherever there is a discrepancy between what our information promises and what we can deliver on site, we have two choices — change our information or change our on-site offerings.

2. Recognise the extent to which information prior to the visit can reduce depreciative or other undesirable behaviour.

An outstanding example has been noted by Hamilton-Smith (1980) from Plitvice in Slovenia. Here all publicity and information emphasises the 'four keywords' of the park: Water, Forests, Waterfalls, Silence. These four words are repeated in 8 languages on the archways through which one enters the park. The result is that visitors treat the park with remarkable respect, and move through quietly, almost as if they were visiting a cathedral.

In a similar way, the message 'Travel Through Time at Wellington Caves' will hopefully convey the idea of an exciting educational experience — something which Wellington is ideally placed to deliver.

In other words, through our prior information, we can not only help visitors to understand what they might expect of their visit, but prepare them to enjoy the experience in an appropriate way. In some cases, the fact that a number of quite different tours are available is not made known, and so visitors arrive, having planned a brief visit, and are disappointed because they cannot stay long enough to see more.

Then the information which might be provided to caving groups wishing to visit the caves should make the outcome expectations of the management authority clear; something which is all too rarely done.

ARRIVAL AND RECEPTION

Few areas are as fortunate as Jenolan in having the spectacular and truly memorable entry through the Arch. But this is no excuse for failing to design an attractive entry at other places. In particular, there are many where a simple re-location of the car park would be of immense assistance to the quality of arrival — visitors should be able to park and then enjoy a delightful walk to the entrance. We can also think about proper location of simple amenities — at one well-known cave area, the dominant vision at the moment of arrival was the brightly lit and brilliantly coloured Coke machine. We should convey something of welcome, awe and mystery, beauty, or grandeur, do it in a way which will be genuinely memorable, and avoid kitsch at all costs.

3. Ensure that the best possible appearance is given at the entry to the cave area.
4. Every visitor should be welcomed as a real person, not just as another number in the queue.

Bus groups demand special attention, simply to overcome the 'conveyor belt' syndrome. A guide should welcome the party as they leave the bus. The purpose of this would include welcoming them, telling them where the toilets and kiosk are and outlining the plan for their visit. It is more difficult with those travelling independently — but the welcome is of immense importance. Just having to join the queue to buy a ticket is already starting behind the post, and demands either a 'welcome and information' guide near the ticket office or a particularly welcoming ticket seller who can answer all the questions about tour options.

FRAMING OF TOURS

Sometimes there is just one cave with only one route and it will demand considerable imagination to ensure that each tour is individualised. But we can do a great deal better in most cave areas. We start with the overall organisation of tours, and move later to issues of pathways arrangement and guiding.

5. Each tour should provide for an appropriate number of people and last for an appropriate time.

Actual tour size should, at least, depend upon:
• the nature of the cave; no tour should be so large that some visitors cannot see the same features as others, or cannot hear the guide
• the character of the tour
Similarly, the timing of the tour should be based in the character of the tour; people should not feel unduly rushed. Then, we all know that some visitors want to go on talking with the guide and at least some recognition should be given to this in time allocation; but schedules certainly have to be maintained.

6. The guide is fundamentally important to all cave visitors; each tour should be based in the relationship between the tour group and the individual guide(s).

In other words, daisy-chain use of multiple guides, changing guides in mid-tour, etc. are all bad practice. In those special situations where it may be necessary to have two guides involved, each should have a clear understanding of their respective and different roles. Other interruptions, e.g., noisy repair or construction work going on during visiting hours or having parties close enough as to disturb each other in terms of either sound or vision is also bad practice. Sending late arrivals to join an already commenced tour should be avoided if possible, but clearly there is always a judgement to be made in this issue.

7. Visitors should be accurately informed as to what they can expect from each tour.

There should always be readily available information about how strenuous any tour may be, how long it will take, and what the character of the tour experience will be. Think about how good it is to have a restaurant menu which not only gives a name to each dish but which tells you in a line or two what the ingredients are and how it is cooked.

8. Avoid mixing unduly diverse kinds of people or diverse interests in any one tour if this will have adverse impacts upon the experience of any visitors.

As an obvious example, a group of high school students should not be on the same tour as a group of old age pensioners; and if there is a tour which comprises an organised party, then one should try to avoid having individual visitors on the same tour.

Allowing photography or video cameras is a common but thoroughly undesirable practice. Other people should not be subjected to the special demands and common lack of good manners shown by photographers. Photography should either be totally banned, or separated off into special photographic tours. It is clear that this is not a matter upon which managers have agreement at this point, at least partly because the articulate demands of photographers tend to overshadow the 'silent majority'. We also note with interest several reports of (sometimes serious) safety problems of photography.

9. Every efforts should be made to identify the needs and interests of all visitors and to provide for these.

This provides a very important balance to the last principle; we should provide an opportunity for the photographers — and for the various ethnic communities, disabled people, people who just want to be entertained, people who want to learn about caves, and so on.

PATHWAYS AND LIGHTING

Best practice in environmental management generally demands that pathways and other engineering be minimised, so there may only be one path. However, with creative design and environmentally sensitive construction, we may well be able to provide alternatives.

10. Pathways and lighting should always provide for as much flexibility as possible in tour arrangements.

At the minimum, in a two-entry system, pathways should be designed for use in either direction; if possible without unduly increasing impacts on the cave, loops or other options might be provided.

Lighting should be such that the pathway always remains lit; this is both an important safety measure, particularly in any emergency, but also enables an individual to easily return to the entrance if they wish. Obviously, this demands low intensity lighting with a minimum of spillover. Fixed feature lights should be installed to match the needs of the guides as agreed by the electrician. They should be able to be switched on and off in any sequence (remote controls are obviously appropriate) and with small groups, or in a cave where it is feasible to split large groups into smaller groups, hand-held lights may well be very much preferable to fixed lights.

TOUR GUIDING

There is virtually universal agreement that the quality of a tour experience depends more than anything else upon the quality of the guide (see Hamilton-Smith 1985). But there is

no such thing as an ideal guide, nor should there be any set of rules about how a particular tour should be conducted. The character of any tour should be based in not just the nature of the cave, but much more in the individual character given to the tour by the guide.

11. Every guide should be expected to develop their own repertoire of tours.

Basically, the best tour will be one where the guide is enthusiastic about what they have to deliver — and that is most likely if it is their own tour program, not a prefabricated one put together by someone else. They should be able to define their objectives in terms of visitor experience, and set their own program content and means of delivery.

Each guide needs to have a diversity of tours to offer, and should be able to set a size and time to suit each one: naturally, if this is carried out properly, then prices may have to vary in relation to size and length of the tour. Each tour would also have to have a brief description available to the public (see 7 above) so that they know what to expect.

12. Recognise that good guiding does not just consist of talking to the tour group.

In the first place, there are a range of other functions, like proper marshalling of the tour group (Hamilton-Smith 1985). More importantly, excessive talking is one of the most common ways in which some guides manage to degrade tour quality. We cannot improve upon natural beauty by talking — it may even be better to insist upon total silence.

Underlying this, of course, there are all the very necessary basic communication principles. The guide must be audible, and the visitor must be able to not only hear but to see any features which the guide is discussing. But above all, each visitor must feel that the guide is acknowledging them and speaking to them. Eye contact, speaking to special issues which interest some people, speaking with people rather than to them, encouraging them to ask questions or comment are all part of the communication package.

Finally, there is the conclusion of the tour experience. Again, this is a human relations issue — we should ensure that we thank people for joining us, and wish them a safe and pleasant journey and many happy memories.

ADVENTURE' TOURS

There has been a gradually developing fashion for 'adventure' or 'wild cave' tours. There are several problems in the very notion as we commonly see it. In particular, it is set up as an opposite to the traditional tour, rather than just one spot on a spectrum. In general and quite idealistic terms, there might be a spectrum where visitors can simply walk through an undeveloped cave with a guide; walk through an undeveloped cave on their own; scramble with some difficulty through an undeveloped cave with a guide(s); scramble through such a cave on their own; or even assist in cave survey, research programs or work programs in the caves.

However, current problems in risk management and the increasing litigation following accidents mean that managers must tread very cautiously. Encouraging, or even

allowing, visitors to enter and move through undeveloped caves on their own should only be undertaken after very careful assessment of the site and the development of a full risk management plan. No doubt this is possible with some caves — but many will prove not appropriate for this kind of activity. Similarly, of course, any guided 'adventure' tourism demands a proper risk management assessment and plan.

Probably all of the same general principles apply here as in a developed cave tour, but there are additional considerations.

13. 'Adventure tours' demand special attention to both safety and environmental considerations.

Guides taking 'adventure tours' must have adequate skills in handling accidents or other safety problems and there must be a risk management and emergency plan in place for any caves selected for this purpose.

Such caves should also be subject to a special environmental assessment before selection with environmental management guidelines being established and observed.

We also know that often these tours are just 'added on' to the existing program without real consideration of the arrangements for issue of equipment and changing clothes. A good example is provided in New Zealand by Black Water Rafting — but we would suggest that while their arrangements are very adequate, they are also the minimum that should be available in an 'adventure caving' operation.

CAVERS

There is a range of groups who wish to undertake exploration and research or recreational caving. First of all, let us be clear that those undertaking exploration and research may well make a massive contribution to the knowledge base for better management of the caves, and should be encouraged at all times. However, this does not ensure that they are necessarily safe, environmentally sensitive or responsible. There are also many kinds of such groups: Speleological Societies, Scout Groups, Schools, Other Outdoors Clubs, Commercial Tour Providers, etc.

14. Cave managers should accept the responsibility of ensuring that ALL caving groups visiting their area are both environmentally responsible and safe.

This means that they are aware of and adhere to the appropriate Minimal Impact Codes and are aware of and act responsibly towards any specific vulnerability of the area concerned. Similarly, they should demonstrate adequate equipment, leadership and safety practices.

We know that although most Speleological Societies are very responsible, there may be the occasional one which at some time in its life-span is just a batch of hoons, and that even in the best group, there will be the odd wild-card member. Managers cannot abdicate the responsibility of regularly checking every group — if a group does damage, it usually cannot be made good again. The focus must be on prevention, not on what we do after the event.

Then there is safety. The kind of training standards being established by the Outdoor Recreation Council of Australia are a very valuable and positive attempt to deal with this and we must continue to work at effective regulation of this kind. However, at this stage, the standards have had to be developed within an outdated and essentially inappropriate educational framework imposed by the training regulation industry. They focus on technical competencies, not on judgement and wisdom, which must be the basis of all safe practice. Anyone with long experience in outdoor recreation management knows that major disasters result not from failure in technical expertise but from mistakes in judgement. Even worse, the ORCA competencies are being applied by a diversity of instructors and instructional organisations. Some of these just do not understand what they are doing, e.g., the instructor who believes he can train people in caving skills by using abandoned mines. He seems to have no understanding that the environmental and safety considerations are very different.

So, do not accept a certificate or any other accreditation as meaning anything other than the best of intentions. As Colin Abbott has pointed out on various occasions (firstly 1981), including the first national meeting held in Australia to discuss outdoor recreation leadership training, “There are many people who are competent and not qualified and many people who are qualified but not competent.” So, the manager must accept the responsibility for checking the equipment and competence of all visiting groups.

THE NATURE OF MANAGEMENT

Finally, we come to a notion that underlies all of our thinking above. One of the characteristics of the prevailing economic irrationality is that it has emphasised the so-called ‘new managerialism’. This involves the boss giving commands from on high which are implemented without argument by the workers. It is an utter nonsense; we have 75 years of industrial relations research which has established that real productivity and quality comes from seeing management not as a role but as a shared responsibility.

15. Management must be seen and operationalised as a shared responsibility by all staff.

We are concerned at the growing perception that guides are not part of the management team, but just carrying out a routine task. Guides not only have a very demanding and highly skilled job; they are the real managers of visitor experience; they should have ready access to staff development opportunities and their expertise should be properly recognised.

Putting it all Together

By now, we have raised a number of issues. If these are all taken as seriously as we hope they will be, the quality of visitor service will be considerably enhanced, but it will mean a new look and often significant changes in practice. In the case of a major cave park, this will demand integration through a Visitor Service Plan.

One aspect of any such plan is the identification of clearly defined objectives for the visitor experience. This single step is vital if we are to follow one of the basic principles of most best practice schemes, namely, the monitoring and evaluation of outcomes. This is not the place to discuss monitoring and evaluation in any depth, but unless there are

clearly defined objectives, then any evaluation of outcomes will be of much more limited value.

But, of course, many cave managers are responsible for relatively small scale operations in a single cave — the full-scale visitor service plan is probably not warranted here, but the same principles apply. Perhaps we need a general manual on visitor service management to provide basic guidelines and advice for both managers and guides?

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Appendix C

British Columbia Speleological Society

Caving Codes of Conduct

Caving Safety: Individual Responsibilities

Before entering the cave:

* Let someone at home know of your itinerary and approximate schedule.
* Select appropriate personal equipment and supplies including headlamp, head protection, protective clothing (including gloves and kneepads), footwear, food and basic emergency supplies.
* Know how to properly use your personal equipment.
* Check your equipment and ensure that it is in good working condition.
* Check the weather and project the (hydrological) response of the cave to adverse weather conditions.
* Don't go underground under the influence of alcohol, drugs, or medication that could impair your judgement or performance.
* Inform the trip leader of any personal physical or mental limitations.
* Never plan to cave alone (groups of 3 are good; groups of 4 are preferable).

Inside the cave:

* ***Accept the trip leader's decisions.***
* Identify, recognize, and evaluate inherent caving hazards (e.g. flooding, hypothermia, fatigue, rockfalls etc.)
* Don't exceed your abilities and limitations.
* Stay together (minimum 2 persons for side passages).
* Don't linger at entrances or other potentially unstable zones, or vertical exposed areas (e.g. pitches, overhanging ice).
* Avoid jumping, sliding, or making (unnecessarily) rapid manoeuvres.
* Don't attempt something untried without a backup plan (e.g. backing out of a tight passage).
* Don't share your equipment.
* Never throw anything into pitches.
* Avoid unnecessary chatter while moving (this distracts other participants who may value silence more than you).
* Know the agreed-upon communication protocol (used when voice communications are impractical or impossible).

Caving Safety: Trip Leader's Responsibility

Before entering the cave:

* Let someone on the surface know of your plans.
* Know how to activate an outside cave rescue operation.
* Ensure that all collective and personal equipment is matched to the cave's difficulty (and in good working order).
* Ensure that basic emergency equipment and supplies are taken (e.g. first-aid kit, pulleys, heat source, extra rope, etc.)
* Plan the underground activity according to age, experience, skills, and physical condition.
* Have a back-up plan.

Inside the cave:

* Distribute experienced cavers to the front and back of group (and use the "buddy system" within the group).
* Progress through the cave as fast as the slowest person.
* Don't ask someone to perform something beyond their capability.
* Use fall protection for all vertical exposures.
* Recognize the symptoms of fatigue and hypothermia.
* Don't hesitate to call a halt to a "bad" trip.

Minimum Impact Caving

* Consult with prior visitors about sensitive features. (This may also reduce the need for redundant visits.)
* Limit the size of the party to the minimum required for a safe visit. (Four is a reasonable lower limit.)
* Use a good source of light. (Avoid using acetylene-based headlamps in confined delicate areas.)
* Use suitable protective clothing.
* Don't smoke or make fires (even at the entrance).
* Stay on the established "minimum impact" route if already established, and avoid touching anything.
* Never break or soil speleothems (including flowstone and moonmilk).
* Don't "push" delicate passages.
* Don't overuse sensitive caves or sensitive interior passages.
* Never mark surfaces.
* Don't discard anything. (Remove all modern discarded objects, even if you were not responsible for putting them there!)
* Don't urinate or defecate inside the cave. (Carry out all human waste in the case of bivouac).
* Don't disturb hibernating bats or other sensitive organisms.
* Avoid altering natural air or water flows.
* Improve personal technique and abilities rather than permanently modifying the cave.

* Use bolts only as a last resort where natural or non-marking anchors (cams, chocks, etc.) cannot be used.
* Place bolts or other permanent fixtures only after thoughtful consultation with the broader caving community, particularly other persons familiar with the cave.
* Use only high-quality bolts, and tag all bolts with the date of installation
* Avoid the use of explosives.
* Avoid unique or unusual sediment accumulations.

Appendix D

Wayfinding in Caves -

A Proposed Curriculum for a Short Course in Self-Rescue
1996 NSS Convention, Salida Colorado

Presented by Dave Lemberg
Department of Geography
University of California at Santa Barbara

Philosophy / Goals

Many rescue calls stem from lost parties in caves. To avoid the need for outside rescue for lost cavers, there are two sets of skills to be learned. The first set of skills is wayfinding in caves (and enroute to and from the caves) - that is, how to avoid getting lost in the first place. Developing good individual and group wayfinding skills and techniques will help avoid "lost in cave" incidents, and will also enhance the caving experience for the participants. The second set of skills deals with reorientation - finding ones way back to the path after one loses one's way. It stands to reason that if a party has managed to get to a section of the cave, they should generally be able to find their way back out.

Useful Tips

Look Back!
Pick out landmarks as you go, and label them.
Drop lots of trash behind you (only kidding).

Human Disorientation in a 3-Dimensional Enclosed Environment (Caves): Why We Get Lost

For the beginner, or for the most advanced and experienced caver, the underground environment presents special difficulties for wayfinding. On the surface, most of our wayfinding is done in two dimensions. In caves, we are faced with a three-dimensional wayfinding task that can be very confusing. Adding to this confusion is the complexity of the cave structure. Caves are often described as being "maze-like", meaning that they have many branching passages, changes of direction (right, left, up, down, and various acute and oblique angles), changes in structure (breakdown, crawls, pits, etc.), and appearance (color, shape, consistency, etc.). The perspective of the wayfinder changes as he or she looks in different directions. The pathway going into the cave does not look like the pathway out of the cave (hence the need for the "look back" rule). All of these properties are confusing - much more so than a standard garden labyrinth or maze puzzle on a sheet of paper.

It is also difficult to orient in cave systems. The actual structure of the cave passages does not match our human intuition of the layout of these passages. Much of our world is rectilinearly oriented, especially in a human-built environment. Underground, this is not the case. The passages are generally not rectilinear, and may curve in any direction. The combination of twisting passages, darkness, and shadows results in a reduced perspective. The darkness itself is disorienting to some. The horizon or field of view may be very close (restricted vistas). We often cannot see the entire passage at once - we can only see what is in the line of sight of our headlight beams. In practice, the combination of various headlamps focusing in different directions and in different intensities presents a very confusing tableau. This distorts our ability to estimate distances. The restricted line of sight in caves limits our ability to grasp the extent of our surroundings. With a limited visual horizon, distance may be estimated a function of the time and/or effort expended in getting from one location to another. Another disorienting aspect of caving is the task of moving through the three-dimensional space of the cave system. Most human wayfinding problems involve paths in 360 degrees of two-dimensional space. Moving through a cave, one must simultaneously orient both vertically and horizontally. The way out is generally up (or occasionally down) rather than just backward.

The cues for orientation underground are also different than those on the surface. There are no sky cues - no sun, no moon, and no stars. Shadows are not a directional cue as they are on the surface. The lack of general surface cues such as horizons and the sun may also create distortions in the perception of time and distance underground. Without a sky (and without a watch), there is no external reference to the passage of time. Time may be measured in terms of the rhythms of caving. Such rhythms include carbide or battery changes and the cycle of brightness of headlamps. Low light levels at the end of the carbide charge or battery life may also distort distance sense. In low light levels, the visual perception of the cave passage deteriorates. Features become fuzzy, shadows become less distinct, colors fade into gray scales, and textures become blurry.

Time may also be measured in terms of bodily functions - hunger, thirst, cold, stress, and fatigue. In extreme conditions, these bodily stresses may distort time perception in themselves. According to some cavers, the greater the level of fatigue, the greater the perceived time and distance for any interval of effort. Time measurement may also be a function of actions or travel. Time and distance are to some extent interchangeable so that one may say that a destination is 2500 feet into the cave, or they may say that the same destination is one hour into the cave. What is one hour in to one group of cavers may be a half hour to an experienced group in good condition, and two hours to a group of cave photographers. Time perception for a group of cavers may well be a function of the slowest caver in the group. Indeed, a slow caver may very well disrupt the spatiotemporal orientation of an experienced caver who would normally traverse the route much faster.

Caving may also disrupt our circadian rhythms of time. Long cave trips may involve over well over 24 hours of continuous activity. Even shorter cave trips may infringe on normal sleeping periods. Combinations of long drives and long cave trips may create symptoms of disorientation and discomfort similar to "jet lag". Symptoms of jet lag

include fatigue, disorientation, lack of energy and motivation, dehydration, and "losing it" (irritation and unreasonable behavior). Cavers should take into account that a long drive followed by a long cave trip can cause time disruption equivalent to flying halfway around the world.

Other difficulties stem from the way a party goes through a cave. There are different speeds and styles of caving. Often a trip leader wants to get to a specific destination quickly for surveying, sightseeing, photography, etc. The type of trip may determine how much the caver learns about the cave. Surveyors and photographers may come out of the cave with detailed observations that synthesize into a comprehensive knowledge of the route. A fast "tourist trip" or an "in-and-out" scientific collection trip does not generally allow the caver the leisure to build wayfinding knowledge. The party moves quickly through at the leader's pace, too quickly for the other members to do the sort of observation required to build route knowledge. At this pace, the other members of the group may become passive followers, unable to find their way without assistance. Depending on the person's position in line, there may be perspective problems. It is difficult to concentrate on learning the details of the cave passage if your perspective is dominated or blocked by boots, back, helmet, or rear-end of the person in front of you.

There are also special problems involved in finding cave entrances and finding one's way back to the vehicle or base camp. One major problem is finding the cave entrance. The entrance may be hidden by vegetation, by rugged terrain, or by other similar looking holes, pits, etc. There are few distinguishing features in may karst landscapes. Often the printed or oral directions are hard to follow (maps seem to be easier to follow than oral directions), inaccurate, or distorted. Distances may be wrong. The "big tree on the hillside" may look no different than all of the other big trees on the mountain, or on the adjacent mountains for that matter. There may be seasonal changes in the landscape - a clear view through the trees in the winter may disappear with the summer foliage. Weather conditions such as rain or fog may obscure views. Darkness is a problem, especially on return trips from caves.

When one leaves a cave, there may be many problems with finding one's way back. Navigating on the surface in darkness creates many of the same problems as in cave navigation. The features and landmarks look different in the opposite direction. Perspective may alter with altitude - one may look up the trail at a mountainside through the trees from the "flats", but looking down from the cave, one will see a sea of foliage and no trail. The problem may be compounded by the fact that many cave trips begin in daylight and end in darkness. The same difficulties one finds in underground wayfinding are actually worse on the surface in that the cues and landmarks one may have recorded earlier in the daylight are no longer visible in the limited beam of the headlight. Distant landmarks used for wayfinding in the daylight may not be visible at all after dark. Add to the problem that one is likely to be fatigued and dehydrated after a long day of caving, and one has the recipe for fatigue and disorientation.

Skills to be Learned

Observation Skills - Learning a Cave

The best method to avoid losing your way in a cave is to learn the cave as you go. Learning the cave involves constantly observing the rooms and passages with all of you senses and recording your images and impressions in some systematic fashion. We can start with a memory exercise. Think back to your last caving experience. Close your eyes and let the memories flow. Visualize the passage. What do you see? What are the textures of the walls? What are the colors? Is the passage wet or dry, muddy or dusty? Is it pretty or dull? What is the most distinguishing feature of that section of passage? From how far away can this feature be seen? How big is the passage? Is it sloping up or down? How do the shadows shift as you move forward? You get a lot of information from your eyes, even in an environment where visually oriented creatures are at a disadvantage.

Now think of your other sensory systems. What did the passage sound like? Do you remember dripping sounds, water flowing, wind sounds, etc.? Did your voices echo? What did your feet sound like on the floor? Ringing on rock? Crunching through gravel? Slurping through mud?

What did the passage smell like? Clean rock and water, mud, decaying detritus, or guano and amberat; they all have their distinctive smells. Or was the smell of the cave overwhelmed by the sweet smell of carbide and ripe coveralls?

What did the passage feel like? Rough, smooth, wet, dry, greasy, dusty, gravelly, muddy, bouldery, etc. Where are you feeling the passage - with your feet, your knees, your hands, your whole body, the top of your helmet with a "clunk"? How warm or cold was the passage? Was there a draft blowing through?

We have gone through the obvious four senses: sight hearing, smell, and touch. We have many others. Think of balance. Was the passage flat or sloping? In which direction? Were you constantly changing your balance like walking over breakdown. Think of your entire body. Was it easy going or were you exerting yourself? How were you moving - walking, crawling, squeezing, climbing, chimneying, ascending, rappeling, etc.?

So far we have just been remembering sensory impressions. The next step is to integrate these impressions with prior knowledge to attach meaning to them. Think about the passage again. Try to classify the passage. Use whatever type of classification that means something to you. Go around the group and state them aloud.

You probably heard anything from shape and size, to geological jargon, to aesthetic commentary. Everyone has their own manner of classifying their surroundings and all are legitimate. Some, though, are more effective in generating route knowledge or map knowledge of a cave than others. A caver has route knowledge of a cave when he or she can describe or follow a path from one location to another. The caver knows a route from

the entrance to "the Big Room", but could not stand at the entrance and point the direction to "the Big Room" or how far away it was in a straight line. To achieve map knowledge of the cave, the caver would know the routes and the cave structure well enough to be able to estimate where to look for a 30' long connecting passage to complete a loop from the "Big Room" to "the Main Passage" if the "Main Passage" passes within 30' of the "Big Room". While such a task is easy on a map, it is exceedingly difficult in a cave in one's head, in three-dimensions.

Most cavers never attain map knowledge of a cave. Fortunately, route knowledge is all that is necessary to avoid major disorientation in cave.

Appendix E

BCCR Small-Party Self-Rescue Skills Guide

Ropes, Webbing, and Equipment
Properties, standards, specifications, strengths, limitations
Handling, checking, care, and storage
Coiling and rope management

Ties
Figure-8 family (on-a-bight, follow-through, Flemish bend, directional, two-loop)
Double Fisherman's bend
Ring bend ("tape knot")
Clove hitch
3-wrap prusik hitch, prusik-on-itself
Italian (munter) hitch, blocked Italian hitch
Load-releasing hitch (Radium 3:1)
Bowline with Double Fisherman's backup
Alpine butterfly
Garda hitch
Overhand knot

Anchors and Rigging
I.D.E.A.S (Integrity, Direction, Equalized, Angle, System)
Natural & artificial anchors: considerations, evaluation, placement techniques, ethics
Direct tie-offs, high-strength tie-off
Single sling, double sling, wrap-3 pull-2
Multiple anchors, equalizing, fixed point, linear
Considerations & cautions for self-equalizing anchors

Belaying
Terminology & belay communication
Types of belay, and considerations for each

Single Rope Technique (SRT)
Ascending systems & techniques (Frog, Mao, Frogwalker, Ropewalker, prusiks)
Descending systems and techniques, ABCDE's, self-belay options, tying off
Frog system: rig set-up and tuning
Changeovers (ascent to descent & vice-versa), negotiating rebelays & redirects
Special problems (knot passing on ascent and descent, overhangs, traverses)

Rescue Principles and Techniques
Accident prevention
Individual equipment for self-rescue
Pick-offs: Sawatzsky system, pick-off and descend with patient, descending a loaded rope
Ascending with a patient

Mechanical Advantage Raising Systems
Use of ratchets
Simple systems (1:1. 2:1, 3:1 z-rig, 4:1, 5:1)
Compound systems (2:1 & 3:1 multiples, piggy-back systems, converting 5:1 to 9:1)
Complex systems, use of 'T-method' for assessing pulley systems
Highline leverage system

Medical, First-aid, and Planning overview
Medical considerations for cave rescue
Pre-planning and preparedness
First-Aider's guide for cave rescue
Rescue & evacuation planning
Improvised evacuation techniques