

CAVE/KARST MANAGEMENT HANDBOOK

FOR THE

VANCOUVER FOREST REGION

JULY 1994



Province of
British Columbia

Ministry of
Forests

Forest Service

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INTRODUCTION

British Columbia has a surface area of approximately 95 million hectares, of which 85% is crown owned forest and range land managed by the Ministry of Forests. Extensive road networks created by timber harvesting have opened the way for many recreational activities. One of these activities, which has become increasingly popular in recent years, is the sport of caving. More than 750 caves, predominantly on Vancouver Island, have been explored; and there may be hundreds, if not thousands more to be discovered. Initially recreational cavers were content to find, explore, photograph and map their finds. However, when some of the more significant caves became vandalized and or destroyed through indiscriminate resource use, individual cavers and caving groups began to advocate government participation in the management of the cave resource.

These caves are a unique non-renewable resource with geological, scenic, educational, cultural, biological, hydrological, paleontological and recreation values. The management of caves [both surface and subsurface resources] is considered to be an essential component of integrated resource management. The Ministry of Forests, within its recreation mandate, has become the focal point for expressing cave resource issues to government.

The purpose of this handbook and accompanying guidelines is to outline the responsibilities for both the Forest Service and the licensees in Vancouver Region; provide staff guidance on impacts of forest operation; provide staff guidance to minimize environmental and recreational overuse impacts in caves; and encourage participation of recreational cavers and commercial caving operators in the identification, planning and management of sensitive cave/karst areas.

PROVINCIAL CROWN LAND CAVE POLICY

The initial framework for cave management was established in January 1981, with the release of the government document entitled "A Statement of Crown Land Cave Policy and Administration". The purpose of this policy was to clarify the administrative and jurisdictional responsibilities of each government agency involved in Crown land cave management; and the role of the caving public and other Crown land users in the conservation and management of Crown land caves (see appendix I).

MINISTRY OF FORESTS' ROLE AND RESPONSIBILITIES

Within the respective mandate of the Ministry of Forests as given in the various legislative acts, the Forest Service has been assigned the responsibility for the following within the provincial forests;

1. Develop and maintain a cave/karst management operational handbook and a general inventory system for caves on Crown land on behalf of all provincial agencies.
2. Develop and maintain a general inventory of caves and location of karst geology under its jurisdiction.
3. Designate, where appropriate, specific caves as Forest Recreation Sites.
4. Develop management plans and guidelines for priority interest caves within the Provincial Forest.
5. Develop and administer general surface and subsurface resource management guidelines for cave/karst drainages to ensure long-term conservation of the resource within the Provincial Forests.
6. Issue, where desirable, co-operative agreements to individual cavers or caving organizations, to manage use of caves according to approved management plan and within the integrated resource management framework on Provincial Forest land.
7. Review prior to issuance, all forms of tenure for commercial cave use within the Provincial Forest.
8. Act as a communication link between forest companies and cavers.
9. Co-ordinate contracts between cavers and government agencies.

COMMUNICATIONS AND COOPERATION

The Forest Service shall encourage organized cavers and forest companies active in the same areas to establish direct communications and working arrangements to improve the compatibility of timber harvesting and cave utilization protection at the operational level.

The Forest Service shall identify to cavers and forest companies, individual staff members at the operational (District) and policy (Regional and Provincial) levels, whose duties include responsibility for caves and karst. The Forest Service will encourage these staff members to establish personal contacts with area cavers and forest company representatives to ensure the best possible communication on cave management issues.

The Forest Service shall communicate cave conservation and safety values to the general public through;

- i) ministry information and interpretation signs at appropriate caves under its jurisdiction;
- ii) co-operative measures with cavers, commercial cave operators and the Forest Industry;
- iii) participation in inter-agency outdoor recreation and public education programs.

PUBLIC ACCESS

Forest Service roads providing access to caves and karst areas will be open to the public at all times, except during times of extreme fire hazard or when there is a significant risk to public safety - for example, a bridge damaged by a flood or slide. In situations where road access threatens the integrity of a highly significant cave, a road may be deactivated. Roads providing access to caves or karst areas will not be maintained by the Forest Service, except where a cave has been designated as a Forest Service Recreation site or as part of an approved Access Management Plan.

CAVE/KARST MANAGEMENT GUIDELINES

Karst is a complex dynamic environment, closely linked to surface environments and surface activities. This linkage generally occurs through the movement of air, water, plants, insects and animals into and out of caves. Altering these movements, or altering the nature of the material being moved, can cause changes in the cave environment. Thus, when surface activities take place in the vicinity of a karst, it is important to understand the resource to effectively co-ordinate and mitigate the activities accordingly.

Selection of the most appropriate management strategies for any particular cave/karst system requires an adequate database on the values present.

A. INVENTORY, CLASSIFICATION AND RECORDS

Components of the system are:

- a) A cave inventory and classification card containing the cave name, location descriptive information, classification and management type, coded from a key list.
- b) A reference or file number for each cave, to be used on each cave file and on a pin or tag placed at the entrance of the corresponding cave.
- c) A master cave location map showing the exact locations of inventoried caves, together with a general map showing only cave areas. These maps should be used to locate existing known caves and to examine areas of karst topography where the potential likelihood of caves is quite high. These maps should also be used to identify significant caves for which more detailed studies may be required.
- d) A permanent reference file on each inventoried cave containing:
 - Inventory and classification records;
 - History of cave, if any;
 - Directions for reaching cave entrance;
 - Photographs or slides, if any;
 - Records of entry (e.g. Candlestick Cave entry logs); and,
 - Records of present or previous stewardship activity.

Procedures and Responsibilities

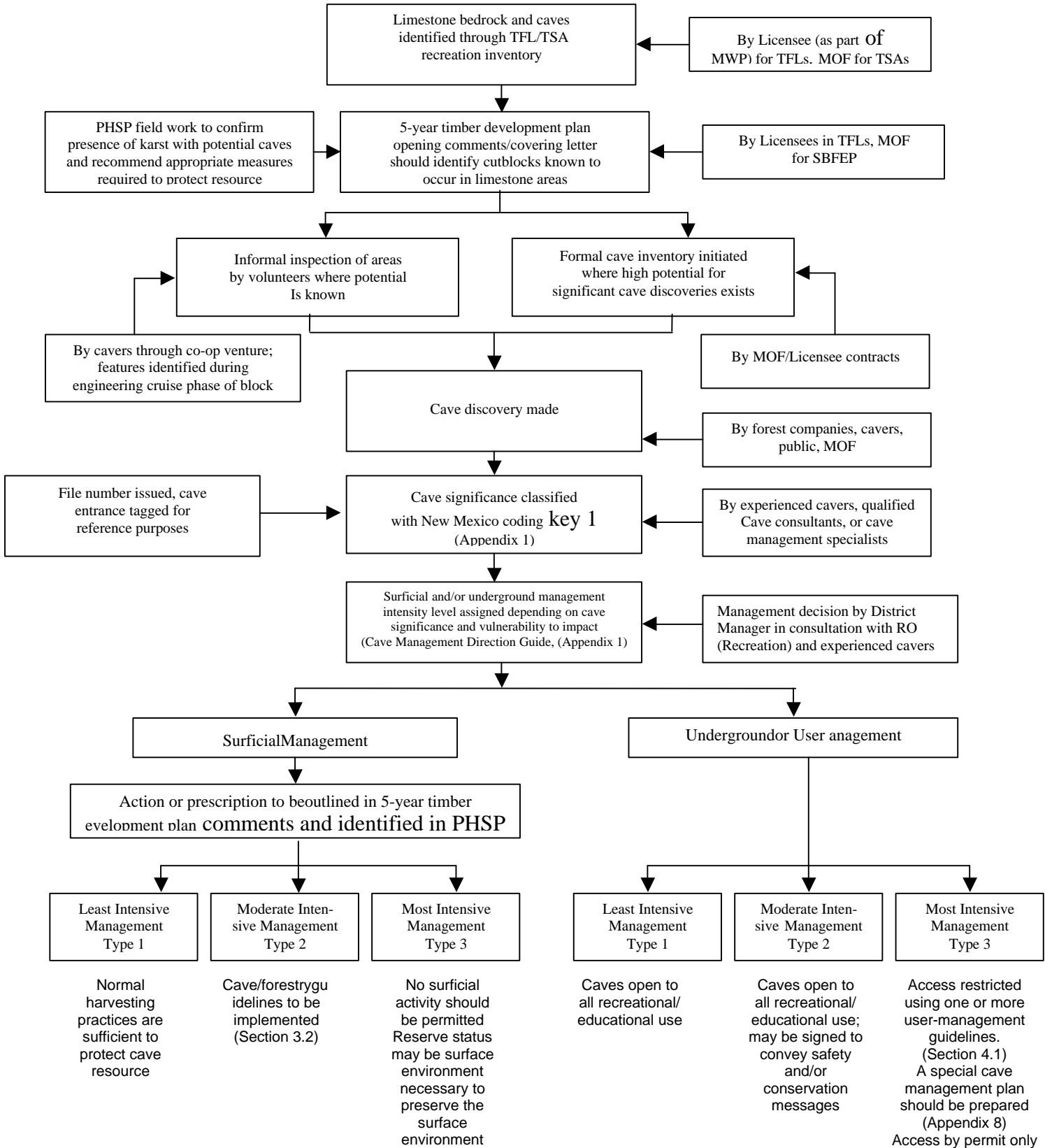
Cave inventory is considered to be an extension and refinement of the Recreation inventory "Land form features" (L⁵) identification. Completion of a recreation inventory, of which caves may be a significant component, is a current requirement of Tree Farm Licence Management and Working Plans (*Forest Act* - Section 28 (d) (i)). Similarly, the Forest Service is responsible on other Crown forest lands.

The District Resource Officer/Recreation prepares the TSA inventories and monitors the quality and content of TFL recreation inventories. Recreation inventories have been conducted for many TSAs and most TFLs in the province. Cave inventories have been undertaken in a few special areas, but considerable field work is required to complete the necessary input for all recreation inventories. Inventory priorities shall be established by Forest Service District Managers in consultation with Regional Recreation Officers and with the advice of informed cavers, as offered or requested.

Figure 1 outlines the process of inventory and classification:

- a) Cave field inventory and classification shall be undertaken by qualified staff in the Forest Service or forest companies, or by contractors or volunteers acting under formal agreements with the Forest Service and/or licensees. Cave values and the appropriate measures required to protect these values must be identified within the PHSP.
 - i) Licensees should identify all proposed development within known karst topography and should make appropriate comments within the draft Five Year Development Plan submission letter. (Consult geological bedrock maps which show known areas of limestone.) When a proposed development boundary lies within a karst formation, as identified by the L⁵ feature in the recreation inventory, a systematic surface inventory to locate cave entrances must be undertaken within this area as well as for the karst information surrounding the development boundary. The extent and intensity of the inventory must be approved by the District Resource Officer Recreation.
 - ii) Company personnel (cruisers, consultants, engineers, etc.) may discover cave entrances during field work. These locations should then be plotted on topographic maps at the appropriate scale (1:5 000 - 1:20 000, depending on the objective).
 - iii) Cavers may discover cave entrances during their recreational activity. These locations should then be plotted on topographic maps at the appropriate scale and submitted to the Ministry of Forests (with copies to the appropriate TFL licensee). Cavers should endeavor to complete a cave classification card during exploration and include this card with cave location submission to the Ministry of Forests.
- b) Cave and karst inventory information shall be correlated and retained in each District by the Resource Officer/Recreation, who shall be responsible for completing, maintaining and safeguarding all records. The Resource Officer/Recreation shall also be responsible for ensuring that the District Timber Coordinator and appropriate licensees are aware of cave and karst values in proposed development areas.
- c) Decisions on the appropriate classification and management for specific caves shall be the responsibility of the District Manager, who may consult with interested cavers or cave experts as desired or required by circumstances.
- d) The District Manager, in consultation with the Regional Recreation Officer, shall be responsible for preparation and implementation of any detailed plans for special cave management situations. All plans must be approved by the Regional Manager before being implemented.

Figure 1: Cave Management Flow Chart



B. SURFACE CONSIDERATIONS

Forest Service procedures designed to protect cave values from surface impacts shall be as follows:

1. The Forest Service will assign each cave under its jurisdiction into one of the following three management types, based on protecting the cave's resource contents and the natural processes that form them. The cave management type may change with time, if damage occurs or a significant new feature is discovered.

MANAGEMENT TYPE A - Least Intensive

No special prescriptions will be required to protect caves of this type from the effect of timber harvesting and/or other surface activities. Caves given this classification relate to those karst feature polygons given a management class 2 in the recreation inventory.

MANAGEMENT TYPE B - Moderately Intensive

Surface management guidelines will be implemented as necessary to protect cave quality and/or contents from the effects of timber harvesting and/or other surface activities. Management guidelines must not allow surface activity to: interrupt cave water flow, cause collapse or blockage of entrance(s), or result in the destruction of cave formations or secondary deposits. Caves given this classification relate to those karst feature polygons given a management class 1 in the recreation inventory.

MANAGEMENT TYPE C - Most Intensive

No surface activity of any sort will be permitted above caves of this nature; their contents are deemed unique or extremely significant relative to other B.C. cave resources. Caves of this type may be considered as candidates for ecological reserves, parks or other protective designations. Caves given this classification relate to those karst feature polygons given a management class 0 in the recreation inventory.

2. In cave and karst areas, the District Manager will include cave management considerations (surficial and access impacts) in the evaluation and approval of timber harvesting cut block and road location plans. The appropriate Forest Officer will include specific clauses in approval of five-year development plans and cutting permits to protect caves requiring intensive management.
3. The Forest Service will circulate this document to all forest companies operating in karst areas. Companies will be required to ensure, and provide proof, that their operational staff and contractors have followed all cave and karst management guidelines in all karst areas. Companies will be encouraged to educate their operational staff and contractors for the sake of better overall resource management.
4. Where warranted after completion of timber harvesting, the Forest Service may restrict road access to protect Management Type B and Type C caves from high public accessibility.

SURFACE ACTIVITY GUIDELINES

The following guidelines should be implemented in the vicinity of caves classified as Management Type B:

- i) All cave entrances should be identified in the field, using bright yellow flagging tape (stenciled CAUTION in large letters) around the entire entrance.

- ii) Field personnel, including fallers, construction crews, yarding crews and their supervisors, should be thoroughly briefed on the special protection measures required for significant caves (Type B and C). This may include on-site discussions between the engineering staff and logging personnel/contractors.
- iii) Harvesting activities should be closely monitored to ensure prescribed cave/forestry guidelines are adhered to.
- iv) A future follow-up meeting between the Forest Service and licensee should be arranged at the time of the joint field inspection, if special conditions and guidelines have been agreed to. (This is to determine both the effectiveness of the recommendations/guidelines, and whether further requirements are warranted).

Planning and Construction for Roads and Landings

Consider the logging system, logging pattern and special road building techniques necessary to permit efficient forest development and harvesting while optimizing environmental protection on karst terrain.

- i) locate roads at reasonable distances from known cave entrances.
- ii) avoid location over caves identified as having thin ceilings.

Where appropriate, after completion of timber harvesting, the Forest Service may require the closure of roads to protect certain caves from high accessibility.

Right-of-Way Felling, Clearing and Subgrade Construction

Emphasis should be placed on falling patterns and construction techniques to minimize sedimentation and rock and organic debris impacts on caves.

- i) fall right-of-way trees away from cave entrances.
- ii) avoid drilling or blasting over or near known cave entrances.
- iii) prevent blasted rock from landing in or blocking cave entrances.
- iv) Avoid introduction of construction debris or sidecast material into cave entrances, or locations where such materials could enter a water body flowing into a cave. Emphasis should be placed on avoiding techniques that produce sidecast material which has the potential to block cave entrances and passageways.
- v) stop operations if a slide occurs which enters or could enter a cave, and notify the Forest Officer immediately.

Pits and Quarries

In developing road surface materials, considerations required are:

- i) avoiding ballast quarrying near known cave entrances and passageways.
- ii) preventing drainage of water or other deleterious products from pits and quarries from entering caves.

Fuel Storage

Avoid fuel spillage or the potential for spillage during fuel storage and fueling operations on karst landscapes and particularly near known caves.

Planning and Operations for Falling and Yarding

Emphasis should be placed on minimizing environmental impact and entrance obstruction around known caves.

- i) fall and yard away from, and not across, known cave entrances to avoid debris accumulations.
- ii) fall and yard trees away from known entrance streams.
- iii) retain non-merchantable and residual trees around cave entrances.
- iv) design leave strips or reserve areas in relation to wind firm boundaries.
- v) suspend logs off the ground while yarding over caves identified as having thin ceilings.

Ground Skidding

Emphasis should be placed on minimizing ground disturbance and maintaining residuals around cave entrances.

- i) prohibit use of heavy equipment (wheeled or tracked) over caves with thin ceilings.
- ii) avoid exposure of mineral soil

Silviculture Planning, Scarification and Burning

Emphasis should be placed on permitting efficient silviculture operations, while minimizing the environmental impact on limestone karst areas containing caves.

- i) identify silvicultural requirements for areas surrounding known significant caves at the time of preharvest assessment, such as specific requirements for reforestation, juvenile spacing, weeding, etc.
- ii) avoid slashburning on limestone bedrock where shallow soils and caves are present.
- iii) use of herbicides should be highly restricted
- iv) keep these activities away from protected zones, leave strips, reserve areas and significant cave entrances susceptible to environmental damage.

C. SUBSURFACE CONSIDERATIONS - Visitor Use and Safety

While many caves lack easily damaged features or serious hazards, certain caves are fragile, have irreplaceable cave features and/or have hazards that require management in order to conserve certain values and/or to ensure public safety. The following Forest Service guidelines address impacts of visitor use on caves and issues of public safety in caves.

The Forest Service will assign each cave under its jurisdiction to one of the three following management types for user management purposes, based on protecting the cave's resource contents and the natural processes that form them. The type of user management may change with time if damage occurs, or if a significant new feature is discovered.

MANAGEMENT TYPE 1 - Least Intensive

Caves will be open to all recreational/educational use. There will be no specified Forest Service management activity (except where elimination of a specific cave hazard is required to resolve a safety problem). These caves contain few, or no items of scientific value. If any such items are present within the cave, they are secondary deposit-type formations of the ordinary type, such as stalagmites, stalactites, columns, flowstone, draperies, and rimstone dams, which are either of such size or are so positioned within the cave that they are not easily damaged and/or vandalized, or removed from the cave without great effort. Basically, a cave in which frequent visitation by any and all types of cavers will cause little or no change within the cave.

MANAGEMENT TYPE 2 - Moderately Intensive

Caves will be open to all recreational/educational use. Management activity will be informational in nature regarding cave conservation, safety, known cave hazards, or precautions or equipment requirements required to enter the cave.

These caves contain secondary deposit-type formations of the ordinary type, such as stalagmites, stalactites, columns, flowstone, draperies, and rimstone dams, which are either of such size, or are so positioned within the cave that they are quite susceptible to breakage and/or vandalism. These caves also may contain formations that are of unusual quality or are very delicate and susceptible to breakage, even by well-trained and very careful cavers, such as selenite needles, gypsum flowers, epsom formations or crystals, cave helictites, moon milk, rare biological species, etc.

MANAGEMENT TYPE 3 - Most Intensive

Caves of this type will be open only to extremely limited recreational/educational use or non-consumptive scientific study. Access to these caves will be by permission of the District Manager, and may be restricted through the use of one or more cave access control alternatives. These caves contain unusual and/or fragile formations or items of scientific value which could and/or would be seriously disturbed or destroyed by visitation, especially by visits of uninformed cavers as to the items of value, i.e. a biological species which has a delicate habitat, or is in danger of extinction in the area or within the particular cave. The items of value could be either archaeological, biological, or paleontological in nature, or very rare cave formations.

Cave User Management Guidelines

This table presents a suggested range of methods for protecting caves by managing visitor use from standpoints of numbers, conservation conduct, and safety conduct. Obviously, no single method is completely effective in itself, and each significant cave will require its own particular combination of user management methods.

<u>Method</u>	<u>Rationale</u>	<u>Advantages</u>	<u>Disadvantages</u>
Isolation	More difficult access means less visitation.	Can be effected without drawing attention to cave; can filter out the unfit or unprepared	Can be eroded by other resource access demands (e.g. logging); does not ensure responsibility or accountability of visitors
Camouflage	Effective against persons not actually looking for the cave	Entrance camouflage may screen out all those not otherwise informed about a cave's existence	No protection once detected; does not ensure responsibility or accountability of visitors
Gating	Gives manager tight control over who uses the cave and how by physically blocking entry	Responsibility and accountability of visitors can be enforced for all visitors except those prepared to destroy gate	Gates can be breached by determined persons; gates are only a means of enforcing a policy, not a means of closing a cave to all; gates antagonize some

<u>Method</u>	<u>Rationale</u>	<u>Advantages</u>	<u>Disadvantages</u>
Secrecy	Can restrict visitors to those in the know.	Managers can select those who know of cave and conditions of being let in	Secrecy never lasts; Control is lost once visitors learn of cave and word spreads; no protection once detected; does not ensure responsibility or or accountability of visitors
Diversion	Can direct visitors from a sensitive cave to a less sensitive cave	Reduces pressure on sensitive caves; focuses use on durable caves at which conservation and safety messages can be stressed	Predicated upon secrecy or low profile of sensitive cave(s); requires acceptable alternatives; no protection once detected; does not ensure responsibility or or accountability of visitors
Signing	Can "educate" would-be cave visitors in conservation and safety principles, warn of hazards, advise of legal access conditions, etc.	Reduce damage and injury from ignorance; can establish contact between manager and visitor, thus influencing sense of responsibility in visitor	Ineffective against a small proportion of public bent on vandalism; cannot ensure responsibility or or accountability of visitors.
Psychological Deterrents	Tone of signing or information can discourage visitors from entering cave(s)	Effective when worded carefully to play on emotions of fear or uncertainty (e.g. "This cave contains bad air")	Ineffective if suggestive of challenge (e.g. "This cave contains dangerous pits and crawlways"); cannot ensure responsibility or or accountability of visitors
General Public Education	Can entrench cave conservation and safety concepts in society as a whole	Over long term can reduce damage and injury from ignorance among majority of population visiting caves	Ineffective against a small proportion of public bent on vandalism; cannot ensure responsibility or or accountability of all visitors; beyond scope of Forest Service mandate - (responsibility of P.O.R.D. Extension and Information Branch, O.R.C. and caving and conservation organizations)

D. NON-GOVERNMENT MANAGEMENT OF CAVES

Applications for management of caves by caving organizations or members of the public for non-profit or commercial cave use may be entertained on a site-specific basis. Consideration would be subject to the submission of an application containing a draft management plan to the Forest Service.

Upon approval of a final management plan by the Forest Service:

- Within Provincial Parks, cave management by non-profit groups may be authorized by a Park Use Permit; or within Recreation or Conservancy Areas, such cave management may be authorized by a Resource Use Permit.
- Outside of Provincial Parks or Recreation Areas, commercial cave management on Crown land for wilderness tourism or other purposes may be authorized by a Licence-of-Occupation or Lease issued under the *Land Act* by the Ministry of Environment, Lands and Parks (after referral to all agencies and with the approval of the Ministry of Forests, as required).
- Outside of Provincial Parks or Recreation Areas, non-profit organizations or individuals may be authorized to use caves by a Letter-of-Authority or Permit issued by the Ministry of Forests or the Ministry of Environment, Lands and Parks. Under this agreement, the government agency would retain overall management authority.

E. PUBLIC SAFETY AND LIABILITY

In order to promote public safety and minimize liability risks to the Crown, the Ministry of Forests should:

- (a) Inform the public of the general hazards associated with cave exploration;
- (b) Inform the public and user groups of any particular hazards of managed caves which might not otherwise be apparent;
- (c) Work with the commercial cave operators to communicate cave conservation and safety values to the general public at appropriate cave areas under its jurisdiction;
- (d) Where special dangers are known to exist in a managed cave, warn visitors in advance through written warnings (map, guidebooks, permits, special agreements, signs posted at entry points, etc.). This is particularly important when the danger is not readily apparent to the user and a reasonably prudent person might not otherwise be prepared.

F. CAVE RESCUE

B.C. Cave Rescue is the rescue and training service of organized caving in British Columbia. It is recognized by the Provincial Emergency Program (PEP) as the lead agency in cave rescue, providing specialized personnel and equipment for cave rescue emergencies on callout by the R.C.M.P. or the P.E.P. Emergency Communications Centre at : 1-800-663-3456 or (604) 387-2957. (see Appendix IV)

REFERENCES

A Statement of Crown Land Cave Policy and Administration. 1981. Ministry of Lands, Parks and Housing.

A Method to Manage the Cave/Karst Resource within British Columbia's Provincial Forests. (DRAFT, 1983.) Ministry of Forests.

Cave Management - Chapter 13, *Recreation Manual.* 1991. Ministry of Forests.

Cave Management Title 2300, Recreation, Wilderness and Related Resource Stewardship. July 1987. USFS Manual, Washington.

GLOSSARY OF TERMS

'Cave' - A cavity in the earth which connects with the surface, contains a zone of total darkness and is large enough to admit a human being.

'Karst' - Geology (topography) characterized by sinking streams, sinkholes, caves and similar features; indicative of underground drainage; developed through the erosion of limestone bedrock via solution.

'Crown Forests Land' - Forested land owned and administered by the Crown of Province. Ownership includes, not only the land surface, but also the subsurface rights, including caves.

'Provincial Forest' - Forest land which is designated under Section 5 of the *Forest Act* as being best managed for timber and forage production, forest recreation; and for water, fisheries and wildlife purposes.

'Recreation Site' - May be designated by the Chief Forester under Section 104 of the *Forest Act* to clearly establish and secure the land for public recreation.

'Letter of Agreement/Authority' - An agreement about how and where a facility will be located, built and or managed between a non-profit user group and the Ministry of Forests.

'Special Use Permit' means a permit issued by the Ministry for a purpose consistent with Section 5(4) of the *Forest Act* or Section 1 of B.C. Regulations 562/78.

'Forest Service Map Notation' is a Ministry of Forests administration label or "flag" that is placed on Ministry of Forests maps and records to indicate Ministry of Forests interest in an area within Provincial Forests (in this case, interest in managing an area primarily for its recreational values).

APPENDICES

Appendix I:	A Statement of Crown Land Cave Policy and Administration - January 1981
Appendix II:	Coding Key for Cave/Karst Inventory and Classification
Appendix III:	Ministry of Forests Cave/Karst Inventory and Classification Card
Appendix IV:	British Columbia Cave Rescue Information Package - October 1993
Chapter 13	Cave/.Karst Management

INTRODUCTION AND BACKGROUND

Throughout B.C. approximately 600-700 caves are known and have been explored. Most of these known caves are on Vancouver Island where favourable geologic conditions and a fairly extensive network of roads (primarily due to forestry operations) have promoted more intensive exploration than elsewhere in the province.

Provincial agencies which have jurisdiction over areas of Crown land that contain caves are the Ministry of Forests and the Ministry of Lands, Parks and Housing. These agencies do not have a general inventory of cave locations on Crown land. As most of the known caves are on forest land, the Ministry of Forests has the primary interest in collecting the information. The Ministry of Lands, Parks and Housing is also interested in knowing the general location of caves to ensure that Crown land dispositions are compatible with desirable protection or enhancement of these resources. However, detailed technical inventories of specific caves, unless they are of outstanding value, are presently beyond the scope of provincial resource management agencies.

In recent years the B.C. caving community has advocated increased government involvement in cave management. To date, with the exception of a few caves which have been gated, cave management on Crown land has been passive, relying upon the lack of cave access or, in many cases, their remote location. In the future more active management may take place. For example, the B.C. Forest Service is instituting a specific management plan for Candlestick Cave on Vancouver Island.

In January, 1980 a discussion paper entitled Cave Resources in British Columbia was produced by the Ministry of Lands, Parks and Housing to provide an overview of the perspectives, issues, problems and opportunities that are associated with natural caves and Karst resources in B.C. Its purpose was to introduce the topic and invite public discussion. Following release of the paper a number of submissions were received by the Ministry.

The following paper, based largely on the comments received and input from an Inter-Ministerial caves committee, outlines general guidelines for the administration and management of caves located on Crown land. These guidelines are not intended to address specific situations in detail, but rather to outline a procedure as to how they might be addressed in a rational manner.

The purpose of this paper is to clarify the roles and responsibilities of various agencies, and to provide an opportunity for the public to comment on these functions. Comments should be addressed to:

The Chairman, Inter-Ministry Caves Committee
c/o Director, Extension and Information Branch
Ministry of Lands, Parks & Housing
1019 Wharf Street
Victoria BC V8W 2Y9

A STATEMENT OF CROWN LAND CAVE POLICY AND ADMINISTRATION

PURPOSE OF THE POLICY

This document clarifies the administrative and jurisdictional responsibilities of each government agency involved in Crown land cave management, and the role of the caving public and other Crown land users in the conservation and management of Crown land caves.

GOALS OF THE POLICY

1. To protect and conserve significant aspects of the British Columbia Crown land cave resource.
2. To provide opportunities for non-consumptive public recreational, educational and scientific use of the province's Crown land caves, and provide opportunities for private sector management of cave resources.
3. To provide appropriate management of Crown land caves using a variety of available management options.
4. To encourage involvement of the caving public and other Crown land users and occupants in the conservation and management of the Crown land cave resource.

DEFINITION OF TERMS

Cave — means a natural cavity in the earth which connects with the surface, contains a zone of total darkness and is large enough to admit a human being.

Crown Land — means land, whether or not it is covered by water, or any right, interest or estate in land vested in the Crown. Ownership includes not only the land surface but also subsurface rights including caves.

Karst — topography that results due to water erosion (solution) of areas dominated by Carbonate rock (limestone).

Lease — a form of tenure in land which gives a right to the use of the property for a specified term.

Licence-of-Occupation — a contractual agreement where the holder (licensee) has the right to enter upon and use for some specified purpose the property of the licensor. No legal survey is required.

Park Use Permit — a licence, which authorizes an activity or course of behaviour or conduct or the occupancy, use or development of a natural resource on or in a Provincial Park.

Resource Use Permit — a license, which authorizes an activity or course of behaviour or conduct or the occupancy, use of development of a natural resource on or in a Recreation Area.

ADMINISTRATIVE PROCEDURES

1. Cave Designation

Provincial government agencies may designate caves in a number of ways to protect and /or manage cave values. The designation options available are described in Appendix One and include: Provincial Park, Recreation Area, Provincial Heritage Site, Order-in-Council Reserve, Ecological Reserve, Designated Use Area, Map Reserve, Forest Recreation Site.

2. Cave Management Guidelines

Caves will be appropriately managed to preserve and protect cave values whenever possible. They will normally be managed by the agency with primary jurisdiction over the affected Crown land unless high public use or exceptional values warrant other approaches.

In most cases caves will be:

- open to all recreation use.
- open to limited recreation use by permit or guide group; or,

Under special circumstances caves will be:

- open to limited exploration by permit due to hazards, fragility, scientific values, and/or presence of archaeological or paleontological material; or,
- closed due to known hazards, presence of endangered species and/or fragility.

Only the surface land which directly affects cave values will be included in cave management prescriptions. It is not expected that surface use would normally need to be altered. However, in certain cases effort will be made to conserve aesthetic values of the cave entrance, natural water table level and integrity of the cave itself through prescribed surface management.

Non-government Management of Caves

Applications for management of caves by caving clubs or members of the public, for non-profit or commercial cave use, may be entertained on a site specific basis subject to the submission of an application accompanied by a draft management plan to the agency with jurisdiction over the cave.

Upon approval of a final management plan by the government agency, permission for:

- cave management by non-profit groups within Provincial Parks may be authorized by a Park Use Permit or within Recreation Areas may be authorized by a Resource Use Permit.
- commercial cave management on Crown land outside of Provincial Parks or Recreation Areas may be authorized by a Licence-of-Occupation or Lease issued under the Land Act by the Ministry of Lands, Parks and Housing, with the approval of the Ministry of Forests, as required.
- non-profit cave access and guiding on Crown land outside of Provincial Parks or Recreation Areas by non-profit clubs or individuals may be authorized by a Letter-of-Authority or Permit issued by the Ministry of Forests or the Ministry of Lands, Parks and Housing. Under this agreement, the government agency would retain overall management authority.

Provincial Agency Roles and Responsibilities

Within the respective mandates of the Ministries of Forests; Lands, Parks and Housing; Provincial Secretary and Government Services; Environment; and Energy, Mines and Petroleum Resources their cave-related roles and responsibilities are as outlined below.

- i) Ministry of Forests
 - (a) develops a general inventory system for caves on Crown land on behalf of all provincial agencies.
 - (b) prepares a general inventory of caves under its jurisdiction.
 - (c) designates, where appropriate, specific caves as Forest Recreation sites.
 - (d) develops management guidelines for Candlestick Cave.
 - (e) issues, where desirable, agreements to individual members of caving clubs to manage use of caves within Provincial Forests, to approved guidelines.
 - (f) develops and administers general resource management guidelines for crown surface areas surrounding caves within Provincial Forests.
 - (g) reviews, prior to issuance, all forms of tenure for commercial cave use within Provincial Forests.
 - (h) provides communication between forest companies and cavers.

- ii) Ministry of Lands, Parks and Housing
 - (a) prepares, where possible, a general inventory of caves under its jurisdiction as part of the database for individual planning projects.
 - (b) recommends, where appropriate, that specific caves be designated as Provincial Parks, Recreation Areas, O-I-C Reserves, Designated Use Reserves, Map Reserves or Ecological Reserves.
 - (c) develops a management and interpretation policy and program for Horne Lake Caves Park and Cody Caves Park.
 - (d) where desirable, issues Leases, Licences of Occupation, Park Use Permits or Resource Use Permits over specific caves on Crown land.
 - (e) develops and administers general resource management guidelines for Crown surface areas surrounding caves within the Provincial Park system.
 - (f) refers unencumbered Crown land applications for tenure alienation to caving groups if there is potential of a cave resource value being affected by proposed Crown land use.
 - (g) where necessary, encourages, or assists in the development of volunteer safety standards for caving.
 - (h) co-ordinates government contacts between cavers and government agencies.

- iii) Ministry of Provincial Secretary and Government Services
 - (a) recommends, where appropriate that specific caves be designated as Provincial Heritage Sites.
 - (b) develops management guidelines for caves so designated.

- iv) Ministry of Environment
 - (a) where appropriate, provides geological, hydrological and biological input to cave inventories and development of cave management guidelines.

- v) Ministry of Energy, Mines and Petroleum Resources
 - (a) where appropriate, provides geotechnical input to cave inventories and development of cave management guidelines.
 - (b) provides communication between the mining industry and cavers.

CAVE RESCUE

It is the responsibility of local caving clubs to undertake all aspects of cave rescue with the local R.C.M.P. co-ordinating the operations. Caving clubs will make their own arrangements for training and assistance in cave rescue operations with appropriate agencies such as the mining industry.

PUBLIC ACCESS ON CROWN LAND

Recreational use of Crown land by members of the public is sanctioned subject to respect for the rights of other bona-fide users and compliance with regulations and management policies established under appropriate statutes.

CONSULTATION - CO-OPERATION

To facilitate communication between caving clubs and government, the Province supports the concept of a single provincial cave council representing all B.C. caving clubs.

The provincial government will encourage involvement of the caving public and other Crown land users where appropriate and possible in:

- (a) detailed inventory and classification of caves.
- (b) development of management guidelines and management plans for individual caves and other plans which cover caves on Crown land.
- (c) management of selected caves.
- (d) an information/educational role to the general public in the promotion of cave safety, use and conservation.

Options for the Designation of Caves on Crown Land

Caves on Crown land may be secured for management purposes through one of the following means:

- i. Provincial Park - Park Act may be designated as a Class A Provincial Park to preserve and/or provide opportunity to utilize outstanding natural, scientific, historic or recreational features for the use, inspiration and enjoyment of the public of B.C.
- ii. Recreation Area - Park Act may be designated as a Recreation Area in order to apply the "principles of multiple land use" compatible with their primary recreational use.
- iii. Provincial Heritage Site - Heritage Conservation Act may be designated as a Provincial Heritage Site if they are of historic, archaeological, paleontological or scenic significance to the Province.
- iv. Order-in-Council Reserve - Land Act may be designated as an Order-In-Council Reserve in order to withdraw them from alienation in favour of public recreation use and/or conservation or educational purposes.
- v. Ecological Reserve - Ecological Reserves Act may be designated as an ecological reserve to serve as ecological "benchmarks", gene pool reserves and/or areas of long-term research and scientific study.
- vi. Designated Use Area - Land Act may be designated for a specific use to the exclusion of other non-compatible uses.
- vii. Map Reserve - Land Act May be designated as a map reserve to withhold Crown land from alienation for development or special management purposes.
- viii. Forest Recreation Site - Forest Act may be designated as a Forest Recreation site to provide forest recreation opportunities for the public compatible with primary forest use.

Appendix 2. Coding key for cave and karst inventory and classification

1. **Cave number** - Permanent reference number to be assigned by a central Provincial clearing house once a satisfactory numbering system has been worked out.
2. **Cave name** - Assign name. Make sure name is unused. Some caves are already known by several names. In this case, the following is suggested for final name assigning:
 - A. Historic name or name given by first person discovering cave.
 - B. If "A" is indeterminable, use the name which is most descriptive of the cave.
 - C. List all other names on separate cards, with a reference to the final assigned cave name.
 1. List all other names under "remarks."
 2. List all other names in master cave file.
3. **Map** - Record the National Topographic Series 1:50 000 scale map reference number and name (e.g. 92 C/16 Cowichan Lake).
4. **Latitude** - Degrees, minutes and seconds as near as can be calculated.
5. **Longitude** - Degrees, minutes and seconds as near as can be calculated.
6. **Plotted** - Indicate if cave has been plotted onto a map or overlay. Y - yes, N - no. Record scale if plotted (e.g. Y-50 000).
7. **Air photo number** - Record the number of the air photo on which the cave is pinpointed.
8. **Elevation of entrance** - Either of the following:
 - a) Altimeter reading recorded in metres, e.g. A1023
 - b) Estimated elevation from contour map, recorded in metres, e.g. E 1020.
9. **Status of land** - Legal status of land on which cave or cave entrance is located:

PRI - private land	PP - Provincial Park
FOR - Provincial Forest Reserve	NP - National Park
VCL - vacant Crown land	ER - Ecological Reserve
LAR - Land Act Reserve	M - other; explain in "remarks"
10. **Geological formation** - List all formations which intersect cave passages.
11. **Legal location** - Legal description of lot or licence (e.g., Hourglass Cave would be "T.L. 5759, Juan de Fuca Provincial Forest"; Cascade Cave would be "B.K. 89, Folio No. 01-2189, Tree Farm 13 of T.F.L. 20"). Owner or licensee could be noted in "remarks."

12. **Records** - Organization or agency initiating file or holding most file material on cave (na).
13. **Type of cave**
- | | | |
|-----------------------|------------------|--------------|
| C - coast or littoral | L - lava tube | S - solution |
| F - fissure | P - pit only | T - talus |
| G - glacier | R - rock shelter | |
14. **Dominant rock type**
- | | | |
|-------------------|------------------------|----------------|
| CO - conglomerate | TR - travertine | SO - soil |
| DO - dolomite | LS - limestone | SS - sandstone |
| GY - gypsum | MX - other metamorphic | MA - marble |
| IG - igneous | SH - shale | O - other |
15. **Type of entrance** - Code as many as apply, starting with the "main" entrance.
- L - large horizontal (more than 3 m x 3 m or 10 sq. metres)
 - H - small horizontal (less than 3 m x 3 m or less than 10 sq. metres)
 - V - large vertical (same as "L" above)
 - S - small vertical (same as "H" above)
 - B - side or bottom of sinkhole
 - Q - quarry or road cut gives access
16. **Number of entrances** - 1, 2, 3 etc.
17. **Length of all known passages**
- a) Surveyed length in metres - S1243
 - b) Estimated length in metres, approximate - A 1240
18. **Pattern of cave**
- | | |
|------------------------------------|---------------------------------------|
| P - single passage/room only | D - dendritic pattern, bifurcating |
| P - pit only, no passages or rooms | M - maze, boneyard, solution, network |
| R - rectilinear pattern | T - trellis/joint control maze |
19. **Trend of cave from entrance** - Express in a bearing on the 360° scale
20. **Vertical relief of cave** - Highest ceiling to lowest floor.
- a) Surveyed relief in metres - S154
 - b) Approximate relief in metres - A150.

21. **Water element** - Code as may apply.
- A - arid, no water
 - M - moist earth
 - D - dripping water
 - P - pool present (less than listed for lakes)
 - F - flooded
 - S - stream or river system in cave
 - I - intermittently flooded
 - L - lakes present (9 sq. metres of surface area, plus an average of at least 15 cm deep).
22. **Hazards present** - Code as many as apply. Supply details under "remarks" if required.
- B - biological hazards (animals, poisonous insects or reptiles, etc.)
 - C - length and/or complexity
 - E - surface evacuation problems
 - F - intermittent or regular flooding
 - G - toxic gasses present
 - H - hypothermia hazard (low temperature, exposure to water, etc.)
 - L - loose rocks or collapse hazard
 - R - underground rescue problems
 - T - tight or awkward passages
 - V - long, exposed drops or pitches requiring tackle
 - W - water with no alternate route
 - P - polluted water
 - N - none
23. **Technical Grade**
- Grade 1 - Easy cave; no pitches or difficulties
 - Grade 2 - Caves without any particular hazardous, difficult or strenuous sections; but may contain small drops and offer some degree of challenge to the caver
 - Grade 3 - Caves that present some hazard or difficulty to the caver; (i.e., squeeze, large underground pitch, difficult traverse, etc.)
 - Grade 4 - Caves which include very strenuous sections or large and wet underground pitches
24. **Cave contents** - Codes as many as apply.
- A - archaeological (artifacts, pictographs, etc.)
 - B - biological (organisms)
 - G - geological structural, hydrological, genetic)
 - H - historical
 - P - paleontological (fossils) (H)

S - speleothems

N - none. Cave, shelter or sink of no special attraction or significance.

T - taphonomic deposits

25. **Appeal Factor**

Low (L) - Caves with no appeal to cavers and/or the general public

Medium (M) - Caves of moderate appeal to cavers and/or the general public.

26. **Feature significance as identified in the recreation inventory**

A - very high capability to attract recreational, educational or scientific use (provincial or higher scope)

B - high capability to attract recreational, educational or scientific use (regional scope)

C - moderate ability to attract recreational, educational or scientific use (local scope)

D - limited ability to attract recreational, educational or scientific use

27. **Management class as identified in the recreation inventory**

0 - Area of outstanding recreational, educational, scientific or heritage value and is most appropriately managed for these values

1 - Area requires special management considerations to protect or maintain recreation, education, scientific or heritage values

2 - Normal forest management practices are adequate to maintain recreation values of the area

28. **Cave marked at entrance with a benchmark or survey reference point**

Y - yes

N - no

29. **Cave classification code**

Surface management type/Subsurface management type

(A,B,C/1,2,3)

Refer to detailed explanation of classification type, Sections B and C of the handbook.



British Columbia Cave Rescue

Coordinated through the British Columbia Speleological Federation
Supported by the Glenn Peppard / Rick Blak Memorial Fund

INFORMATION PACKAGE October 2000

BC Cave Rescue is the rescue and training service of organized caving in British Columbia. It is recognized by the Provincial Emergency Program as the lead agency in cave rescue, providing specialized personnel and equipment for cave rescue emergencies on callout by the RCMP or the PEP Emergency Coordination Centre.

Initial callout for BC Cave Rescue within British Columbia and Alberta should be through the PEP ECC at:

1-800-663-3456.

Primary BC Cave Rescue contact persons are:

SOUTHERN INTERIOR COORDINATORS

Phil Whitfield (PROVINCIAL COORDINATOR)	2067 Valleyview Drive Kamloops BC V2C 4C3 piwhitfi@direct.ca	(250) 372-5079h 828-4122w 371-3747fax
Trevor Moelaert	4539 Horak Rd Kelowna BC V1W 1R8 alltmoe@silk.com	(250) 764-2322h/fax 862-6050c

SOUTH COAST COORDINATORS

Rick Coles	1812 Elford Rd Shawnigan Lake BC V0R 2W0 colesr@camosun.bc.ca	(250) 743-6704h 370-4908/4910w
Gerry Campbell	7430 Rodgers Road (Box 60) Merville BC V0R 2M0 kathycam@mars.ark.com	(250) 337-0004h 897-7726 pager
Rob Wall	5052 Whitewater Place Chilliwack BC V4Z 1H5 basecamp@uniserve.com	(604) 858-1767h (604) 819-4272c

KOOTENAY AND CAVE DIVING RESCUE COORDINATOR

John Pollack	Site 12, Comp. 40, RR 1 South Slocan BC V0G 2G0 john.pollack@gems8.gov.bc.ca	(250) 359-7341h 354-6274w
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NORTHERN B C COORDINATORS

Bob Rutherford	3214 Riverview Prince George BC V2K 4Y7 brutherford@mail.canfor.ca	(250) 562-4176h 561-4431w
Lance Amos	2265 West Fraser Road Quesnel BC V2J 6K1 highangle@uniserve.com	(250) 992-9594h 992-3130w

MEDICAL COORDINATOR

K. David Sawatzky, MD	284 Codsell Avenue Toronto ON M3H 5V7 sawatzky@accessv.com	(416) 638-2058h 635-2000, Ext3109w
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ADDITIONAL RESOURCES

CROWSNEST PASS RESCUE - Municipality of Crowsnest Pass, Coleman, Alberta
Key Contacts:

Crowsnest Pass Dispatch System emergency line: **403-562-2255**
non-emergency: 403-562-2551

Rescue - Chief: Daryl Ferguson 403-562-2806w 403-562-2357h
- Deputy: Mike Taje 403-563-3868h 403-562-3210 or 3289w
lmtaje@telusplanet.net

RCMP, Blairmore Detachment 403-562-2866 (24 hour) 403-562-2867

NATIONAL CAVE RESCUE COMMISSION (United States) - NCRC is the National Speleological Society's cave rescue training and networking body. It is not itself a rescue body, but can assist SAR authorities in locating cave rescue personnel and equipment. Note U.S. national SAR VHF frequency is 155.160 MHz.

NCRC Pacific Northwest Region Coordinator:

John PUNCHES	PO Box 1165 Roseburg, Oregon 97470 john.punches@orst.edu	(541) 957-5461h 672-4461w
John Gookin	858 Tweed Lane Lander, Wyoming 82520-9742 gookin@nols.edu	(307) 332-7716h

RECOMMENDED CAVE RESCUE EMERGENCY PROCEDURES

1. General public contacts RCMP or PEP ECC (Alberta or BC)
1-800-663-3456

Concerned member of public or caver contacts a BCCR caver or coordinator.
Go to Step 3.

2. RCMP or PEP ECC contacts BCCR -

1st - Provincial Coordinator; if no contact -

2nd - Area Coordinators, preferably in order listed; if no contact -

3rd - individual cavers as listed for communities nearest incident who

will either contact a designated Coordinator or proceed to Step 3 on an acting basis.

3. BCCR representative provides expert assessment of situation and pursues an A or B response, as appropriate.

A - Major or life-threatening situation

B - Less serious situation (e.g. overdue party)

A4 - BCCR recommends that RCMP initiate a formal rescue operation under the 1992 BCCR/PEP/RCMP/BCAS Memorandum of Understanding, mobilizing support as appropriate. RCMP contacts PEP ECC to obtain Task Number for operation.

B4 - BCCR representative consults with BCCR Coordinators and local cavers to further evaluate the situation. If not already contacted, RCMP may be alerted and briefed.

A5 - Upon initiation of A4, BCCR designates a Coordinator to work with designated RCMP, PEP and BCAS representatives.

B5 - BCCR may dispatch a team to investigate, assist, etc., as appropriate

a) internal resolution b) serious situation

A6 - BCCR undertakes a callout -
 1st - area cavers and resources
 2nd - out of area cavers and resources
 3rd - NCRC (American) resources
 - may also request, through RCMP, specific support from PEP (e.g. air transport, surface support)

B6 - BCCR reports back to RCMP and PEP ECC

a) incident closed b) proceed to **Step A4**

A7 - BCCR designates:
 - field cave rescue leader
 - off-site central BCCR contact

A8 - Cave rescue proceeds under RCMP authority with PEP liaison, above ground support and Task Number.

GENERAL INFORMATION

- Formed in 1984 as the cave rescue resource network of organized caving in British Columbia, the BC Speleological Federation (BCSF) and the Vancouver Island Cave Exploration Group (VICEG), both registered provincial societies. Administered by a six-member Commission of the BC Speleological Federation (Phil Whitfield, Lance Amos, Gerry Campbell, Rick Coles, Trevor Moelaert, John Pollack, Bob Rutherford, Rob Wall).
- Volunteer operation financially supported by the Glenn Peppard/Rick Blak Memorial Fund, the Rennie/Clark Memorial Fund of VICEG, training course registration fees and various caving club and private contributions.
- Operates under a 1992 Memorandum of Understanding with the Provincial Emergency Program (PEP), the Royal Canadian Mounted Police (RCMP) and the BC Ambulance Service, and with access to the resources of the U.S. National Cave Rescue Commission (NCRC). Training is to PEP or NCRC standards.
- Holds a week-long Training Seminar in Cave Rescue Organization and Techniques in July every even year (e.g. 1998-2000-2002), and regional Small Party Self-Rescue weekend workshops annually (no formal certifications).
- Coordinators each have over 10 years of caving experience as well as technical and cave rescue qualifications and experience.
- Capable of responding to cave rescue emergencies anywhere in Western Canada and the Northwestern United States and Alaska. The primary cave rescue equipment cache is located near Courtenay with secondary caches at Kamloops and Prince George.

CAVE DIVING RESOURCE PERSONS

Many BC and Alberta caves with flooded passages also have extensive air-filled sections. Any overdue diver could be stranded in one of these sections, fighting hypothermia. Do not automatically assume that an overdue diver is dead unless the cave is known to have no air spaces, or unless a partner confirms that a body recovery is required. In case of uncertainty, a speedy response is a correct response.

A Western Canada Cave Diving Recovery and Rescue Manual (John Pollack, 1992) is available from John Pollack or Phil Whitfield for those in areas of cave diving activity. Western cave divers in the organized caving community include:

John Pollack	RR1, Site 12, Comp 40 South Slokan BC V0G 2G0 250-359-7341h 666-4071w	- no longer cave diving, but fully equipped - U.S. cave diving certification - Castleguard, Dezaiko, Bluebell, Northern Vancouver Island - NSS/CDS Recovery Diver Area Coordinator
Patrick Shaw	792 East 15 th Avenue Vancouver BC VV5T 2R7 604-876-1968/57h 666-4071w	- active and fully equipped - extensive Northern Vancouver Island experience
Peter Norris	Apt 304, 2355 Trinity Street North Vancouver BC V5L 1B9 604-251-6653h 437-0491w	- active and fully equipped - extensive Northern Vancouver Island experience

BC CAVE RESCUE SOUTH COAST EQUIPMENT CACHE

Located at the **residence of Gerry Campbell, 7430 Rodgers Road (Box 60), Merville**, north of Courtenay (east off Island Highway at Merville Store and north at end of road), **phone (250) 337-0005h, (250) 897-7726 pager**.

Equipment is bagged in large orange, blue and yellow PVC bags marked by function. Webbing is day-glo yellow or white, labeled with black felt pen, and equipment is marked with day-glo yellow paint and/or stamped "BCCR" or "R". Some 300 m. of rope, also stored in bags, is designated for rescue and rescue training.

Cache established with considerable financial support from the Rennie/Clark Memorial Fund of the Vancouver Island Cave Exploration Group and the Glenn Peppard/Rick Blak Memorial Fund.

The following list summarizes components of the Rescue Cache. Detailed lists are available from Phil Whitfield or Gerry Campbell.

- 2 stretchers: SKED and Casdade 200 (2-piece model), c/w rigging
- 1 Kendrick Extrication Device (KED)
- 2 exposure bags, PVC and nylon, with carrying handles
- 2 sleeping bags, all synthetic, in stuff sacks
- patient packaging pack containing polypropylene fleece blankets, reinforced space blankets and pile clothing
- 5 rigging packs (2 normally stored in Calgary) containing carabiners, pulleys, rack, prusiks, webbing, rope pads, chocks, etc.
- medical pack containing bandages, dressings, splints, etc.
- 2 185 kHz cave radios (Ian Drummond) in Pelican cases, c/w antennas and adaptors for cave survey and location work (normally stored with Rick Coles in Victoria/Shawnigan Lake)
- 1 field telephone system, 3 handsets, 300 m. of spooled wire
- 4 FM Radio Shack FM handsets
- Administrative kits: ammo boxes containing Duksbak notebooks, pencils, flagging tape, markers, and instructions for key Incident Command System positions in cave search and rescue operations
- 3 initial response ("bash") packs containing route marking, emergency first aid and packaging supplies for initial cave search

CAVE RADIO

BCCR has two Drummond low frequency Cave Radios (185kHz / 35kHz) capable of intercommunicating through several hundred metres of limestone. They can be used for underground to underground or underground to surface communications or to establish precise surface locations above underground sites in a rescue situation. They can also be used in cave surveying. The radios are stored with Southern Vancouver Island Coordinator Rick Coles (see p.1).

VHF PROGRAMMABLE RADIO

BCCR owns a VHF programmable radio (stored with Rick Coles) for emergency use by caving parties operating in areas such as Weymer Creek which have line of sight communication with Ministry of Forests or other repeaters. Contact Rick for area specific use information. Parties linking with the BC Tel system should connect with BCCR through the PEP ECC (1-800-663-3456).

PERSONAL LOCATOR BEACON

BCCR owns a Satfind-406 Pocket PLB (A78F200011F1001, upgraded June 2000) which may be issued to caving parties operating in remote locations. Such parties file a Rescue Contingency Plan with BCCR and PEP ECC which provides information on the party, its operating location and its contingency plans, and designates an immediate backup party. In the event of an emergency, the PLB can be activated at the surface and the pre-arranged response initiated in as little as 40 minutes through RCAF Trenton and PEP ECC. An internal homing beacon can guide rescue aircraft to its precise location.

BCCR REGISTERED RESOURCE PERSONS

The lists on the following pages are current selections from a more complete register of cave rescue resource personnel in British Columbia and Alberta. It may be used to connect with the BCCR network. The following coding applies:

Re - Regions

S - Southern Interior
N - Northern Interior
C - Coast
A - Alberta

R - rescue training or experience level:

0 - no rescue training; limited cave experience
1 - experienced caver; no rescue experience
2 - basic cave rescue training/skills
3 - advanced cave rescue organization/skills

S - number of BCCR
Seminars attended

LYr - most recent year
attended

M - medical or first aid training level

0 - no medical/first aid training or skills
1 - outdated first aid training
2 - current basic first aid training
3 - current advanced first aid training

* - Coordinator (backup **)

h - home phone
w - work or day phone
c - cellular phone

E - equipment of use in a rescue

0 - no equipment
1 - basic personal caving equipment
2 - extra caving gear
3 - extra caving and rescue equipment

Shaded information may not be current. More details are available upon request from Phil Whitfield.

<u>Re</u>	<u>City</u>	<u>Last Name</u>	<u>First Name</u>	<u>Phones</u>	<u>R</u>	<u>M</u>	<u>E</u>	<u>S</u>	<u>LY</u>
									<u>r</u>
S	Cranbrook	Volkers	Tom	250-426-7396h 250-426-3391w	2	1	1	1	89
S	Fernie	Crapelle	Mark	250-423-6813h	2	1	1	2	98
S	Golden	Leidloff	Glen	250-344-2150h	2	2	2	1	92
S	Kamloops	Whitfeld*	Phil	250-372-5079h 250-828-4122w	3	1	3	8	98
S	Kamloops	Russell	Kirsten	250-573-6007h 250-314-9350w	1	3	1	1	98
S	Kamloops	Torry	Don	250-376-3339h 250-828-3554w	3	2	1	4	00
S	Kelowna	Moelaert*	Trevor	250-764-2322h 250-860-6050w	3	3	3	3	00
S	Kelowna	Moelaert	Nancy	250-764-2322h 250-860-6050w	3	3	3	3	00
S	Kelowna	Porter	George	250-764-1071h 250-765-1481w	2	0	2	1	98
S	Kelowna	Turner	Bruce	250-762-3874h	2	2	2	1	98
S	Penticton	Rand	Bryan	250-494-0972h 250-493-1535w	3	3	1	1	96
S	Revelstoke	Dafoe	Eric	250-837-4493h 250-837-6274w	3	3	3	1	90
S	Revelstoke	Kors	JP	250-837-4394h 250-837-6274w	3	3	3	1	92

<u>Re</u>	<u>City</u>	<u>Last Name</u>	<u>First Name</u>	<u>Phones</u>	<u>R</u>	<u>M</u>	<u>E</u>	<u>S</u>	<u>LY</u>
S	Revelstoke	Schleiss	Johan	250-837-5987h 250-837-5361w	2	3	2	1	96
S	South Slokan	Pollack*	John	250-359-7341h 250-354-6274w	2	3	2	-	-
N	100 Mile House	Vilac	Barry	250-395-4847h	2	1	1	4	98
N	Prince George	Rutherford*	Bob	250-562-4176h 250-561-4431w	3	1	3	2	98
N	Prince George	Meakin	Gordon	250-563-5939h 250-561-1101w	3	1	3	6	94
N	Prince George	Willis**	Gary	250-564-2316h 250-562-2009w	3	3	2	2	00
N	Prince George	Blair	Glen	250-564-5015h 250-563-7161w	2	1	2	1	98
N	Prince George	Blair	Trent	250-963-9141h 250-563-7161w	2	0	2	1	98
N	Prince George	Merritt	Dave	250-963-9554h	3	2	2	2	00
N	Prince George	Evans	Errin	250-846-5671h	2	3	1	1	00
N	Prince George	Mercier	Brent	250-614-1177h 250-564-6642w	2	3	1	1	00
N	Prince George	Safford	Kirk	250-564-8017 250-372-8783parent	2	3	1	1	00
N	Prince George	Cutts	Steve	250-561-0736h 250-563-9583w	2	1	1	2	94
N	Prince George	Griffith	Ed	250-563-7036h	2	2	1	1	92
N	Prince George	Koppe	Peter	250-962-5035h 250 962-9611w	2	3	1	1	87
N	Prince George	Matthews	Dave	250-561-0869h 250-562-2935w	2	0	1	2	94
N	Prince George	Van Noort	Ben	250-563-8698h 250-561-3980w	2	2	2	1	94
N	Quesnel	Amos*	Lance	250-992-9594h 250-992-3130w	3	2	3	4	00
N	Quesnel	Richardson**	Vernon	250-747-1136h 250-992-5511w	3	1	1	3	00
N	Smithers	Ennis	Graham	250-847-8826h 250-662-0800w	2	3	1	1	96
C	Abbotsford	Madsen	John	604-850-8556h	2	3	3	1	98
C	Campbell River	Griffiths**	Paul	250-923-1311h/6211fax	3	1	3	1	87
C	Campbell River	Macnab	Scott	250-923-0024h	2	2	1	1	94
C	Campbell River	Baechler	Alex	250-923-6103h	2	3	1	1	00
C	Chilliwack	Wall*	Rob	604-858-1767hw 604-819-4272c	2	3	2	1	98
C	Comox	Riley	Jeff	250-703-3543h	2	3	1	1	00
C	Comox	Mitchell	Mervyn	250-339-7004h	2	0	1	1	87
C	Coombs	Neden	Ken	250-951-0304h 250-723-2371w	1	2	2	2	98
C	Courtenay	Varela	Richard	250-339-9150hf 250-248-7829c	2	2	2	1	89
C	Courtenay	Hassell	Mark	250-248-7829hw	3	3	1	1	00
C	Courtenay	Price	Shayne	250-338-2812h 250-248-7829w	1	0	1	1	98
C	Cumberland	Goldscheider	Karl "Dusty"	250-897-7721h	2	3	1	1	98
C	Hornby Island	Chase	Dale	250-335-2416h	2	2	1	1	88
C	Langley	Dyck	Chris	604-888-3310h	2	3	2	1	98
C	Merville	Campbell*	Gerry	250-337-0005h 250-334-5741w	3	3	3	4	98
C	Nanaimo	Bischoff	Brian	250-753-8587h	3	2	2	2	88
C	Port McNeill	Nasby	Bill	250-956-3346h	2	2	1	1	96
C	Port McNeill	Henwood	Mike	250-956-4827h	1	2	1	-	-
C	Sechelt	Cole	Kate	250-740-0511h 250-885-6016w	2	2	1	1	98
C	Shawnigan Lake	Coles*	Rick	250-743-6704h 250-370-4908w	3	0	3	3	00
C	Sidney	Catto	Ian	250-655-4828h 250-652-0221w	1	3	1	1	98
C	Sooke	Grundy**	Steve	250-642-7728h 250-391-2579w	2	0	3	1	92
C	Surrey	Johnson	Vic	604-576-4001h 604-533-7848w	1	1	2	1	98
C	Tahsis	Davis	Martin	250-934-6278h	2	2	2	-	98
C	Tahsis	Vanderberg	Alisa	250-934-6278h	1	1	2	1	98
C	Vancouver	Roberts	Kevin	604-879-9599h	2	1	1	1	87
C	Vancouver	Honcharuk	Larry	604-929-5984h	2	2	1	1	96
C	Vancouver	Morris	Tich	604-817-8793h	2	0	2	2	96

<u>Re</u>	<u>City</u>	<u>Last Name</u>	<u>First Name</u>	<u>Phones</u>	<u>R</u>	<u>M</u>	<u>E</u>	<u>S</u>	<u>LY</u>
C	Vancouver	Shaw	Patrick	604-876-1968/57h 604-666-4071w	1	0	2	-	-
C	Victoria	Coles	Rick	250-743-6704h 250-370-4908/10w	3	1	3	3	98
C	Victoria	Catto	Ian	250-744-2383h 250-652-9654w	2	1	1	2	00
C	Victoria	Paulus	Dawn	250-744-2383h 250-652-9119w	2	0	1	1	00
C	Victoria	Burden	Jacque	250-598-8368h 250-386-1145w	2	2	1	1	00
C	Victoria	Card	Devin	250-385-5025h 250-248-7829w	2	3	1	1	00
C	Victoria	Countess	Rob	250-385-1135h	2	1	1	1	98
C	Victoria	Drummond	Margaret	250-382-9867h	2	1	1	2	98
C	Victoria	Shand	Angus	250-743-6704h	2	0	1	1	94
C	Victoria	Hetrick	Nadine	250-391-0882h 250-386-1043w	2	1	1	2	96
C	Victoria	Jacek	Jim	250-385-2847h 250-744-9367c	2	1	1	1	92
C	Victoria	Baskin	Lenore	250-385-2847h 250-383-0441w	2	1	2	1	96
C	Victoria	Kozsan	Ron	250-391-0882h 250-389-3074w2	1	0	1	-	-
A	Athabasca	Keen	Clive	780-675-7112w	2	0	1	2	98
A	Calgary	Chaychuck	John	403-274-8424hw	2	2	1	3	00
A	Calgary	Rollins	Jon	403-282-6177hw	2	2	2	1	94
A	Calgary	Drummond	Ian	403-288-4034h 403-237-4584w	2	0	3	1	94
A	Calgary	Drummond	Stephen	403-288-4034h	2	0	3	1	94
A	Calgary	Fears	Danny	403-640-4513h 403-660-1172c	2	2	1	1	96
A	Calgary	Weeks	Dennis	403-241-3920h	2	2	1	1	89
A	Calgary	Spahl	Randy	403-249-9329h	2	1	2	1	88
A	Calgary	Reichert	Mark	403-229-2130h	1	1	1	1	98
A	Calgary	Donovan	John	403-283-0919h	1	0	2	-	-
A	Calgary	McKenzie	Ian	403-234-8829h 403-292-5960w	1	0	2	1	96
A	Calgary	Hanus	George	403-630-3835h 403-717-6206p	2	2	1	1	00
A	Canmore	Gallagher	Lloyd	403-678-5371h 403-591-7767w	3	3	3	1	89
A	Canmore	Shaw	Mike	403-678-6008h	3	3	3	5	94
A	Canmore	Yonge	Chas	403-678-8819h	2	3	2	-	-
A	Edmonton	Engler	Rainer	780-484-3934h	2	1	1	1	98
A	Edmonton	Coward	Andrew	780-437-0474h 492-2767w	2	2	1	1	94
A	Edmonton	Coward	Julian	780-437-0474h 790-7820w	2	1	3	1	94
A	Edmonton	Wachniak	Terry	780-451-6344h 403-486-3300w	1	1	1	1	98
A	Jasper	Bellemare	Yves	780-852-3609h	2	0	1	1	94
A	Jasper	Buckle	Sean	780-852-3271h 852-6161w	2	2	1	1	94
A	Jasper	Lacelle	Ron	780-852-3301-6147h 6058w	2	1	2	2	94
A	Lake Louise	Worobets	Chris	403-522-2110h 522-3866w	3	3	3	1	92
A	Seebe	Gee	Frank	403-673-2439h 673-3663w	2	1	1	2	90

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Chapter 13 **Cave/Karst Management**

- 13.1 Introduction**
- 13.2 Goals**
- 13.3 Roles**
- 13.4 Responsibilities**
- 13.5 Inventory**
- 13.6 Management**
- 13.7 Liaison and Communication**
- 13.8 Safety and Rescue**
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Figures

- 1 BCFS Cave Management Flow Chart**

13.1 Introduction

Caves and karst resources are one of the many recreation features that collectively make up the Provincial Forest recreation resource.

Cave management is a unique management challenge.

Cave: *A cavity in the earth which connects with the surface, may contain a zone of total darkness and is usually large enough to admit a person.*

Karst: *The topographic feature created by extensive chemical weathering of limestones, gypsum and other rocks by dissolution; geomorphologically characterized by a blocky appearance, tall rock pillars, scarps and sinkholes, and underlain by caves, caverns and underground drainage (streams, etc.).*

Cave system: *An underground network of caves, caverns and passageways in a given area whether continuous or discontinuous from a single surface opening.*

Limestone: *a sedimentary rock generally formed in large, shallow seas and primarily composed of calcium carbonate (CaCO₃); readily dissolved by carbonic and other weak acids.*

Caves and other karst resources are part of British Columbia's Provincial Forest recreation resources. As road development continues to open up the forest, these resources become more accessible and are used by increasing numbers of people.

Caves represent dynamic natural systems that are affected by surface and underground environmental changes. Although similar in many respects to surface resources, cave and karst resources present some unusual management challenges because of the non-renewable nature of cave contents, the sensitivity of cave and karst ecosystems to the activities of humans, and the inherent hazards associated with their recreational use.

Over 500 caves have been found throughout British Columbia and have been explored to varying degrees. In addition, there is an unknown number of caves yet to be discovered.

Initially, recreational cavers (spelunkers) were content to explore, photograph and map their finds. However, when some of the more significant caves became vandalized or destroyed through indiscriminate use, recreational or otherwise, individual cavers and caving groups began to lobby government and to advocate co-operative participation in the management of cave and karst resources.

The Ministry of Forests became actively involved in cave management in 1980 with the development of a management plan for Candlestick Cave near Campbell River on Vancouver Island. Authority for this involvement was based on the Ministry's overall resource management responsibilities established in Sections 2 and 3 of the *Forest Act*, and Section 4 of the *Ministry of Forests Act* (Chapter 2).

In January 1981, a government policy titled "A Statement of Crown Land Cave Policy and Administration" was issued by the Ministry of Lands, Parks and Housing. That policy statement formally charged the Ministry of Forests with the responsibility of identifying, managing and protecting caves in (and under) Provincial Forests.

Cave and karst formations are limited to limestone areas which, in British Columbia, are found in only a small number of forest regions and districts. This chapter, therefore, represents only a summary of the more detailed draft report, *A Method to Manage the Cave/Karst Resources Within British Columbia's Provincial Forests* that was prepared by the MoF in 1983 as a discussion paper on cave management.

13.1 *continued*

For more detailed information on cave management, contact the Recreation Branch.

In those areas where cave and karst resources or issues play a significant role in the recreation program, region and district staff and forest licensees may contact the Recreation Branch directly to request additional information and training materials.

In this chapter, Section 13.2 sets out the Ministry's overall goals in cave and karst management.

Section 13.3 outlines the Ministry's basic roles in cave and karst management.

Section 13.4 sets out the Ministry's overall responsibilities in cave and karst management.

Section 13.5 summarizes the procedures for cave/karst inventories.

Section 13.6 outlines the Ministry's management of cave/karst resources.

Section 13.7 discusses the issues of communication and liaison with cave users.

Section 13.8 identifies some safety and rescue considerations.

Section 13.9 gives a list of cited and supplementary references.

Cave Management Symposium held to chart new management directions.

In February 1991, a Cave Management Symposium was held in Campbell River to address cave management issues and chart direction for the management of BC's cave/karst resources. This chapter will be updated to reflect new directions arising from this recent symposium.

13.2 Goals

Cave management goals are another example of the dual role of the Ministry's recreation program:

The Ministry of Forests primary goals in cave and karst management are to:

balancing resource protection with resource use.

- balance surface resource management and recreational cave use with the protection of significant cave/karst values
- provide opportunities for cave-related recreational, educational and scientific activities

13.3 **Role**

The Ministry of Forests basic roles in cave/karst management are to:

- prepare a general inventory of caves under its jurisdiction
- develop and use the New Mexico reference system for cave inventory, classification and record-keeping (Section 13.5)
- provide communication links between forest companies and cavers on cave- and karst-related issues
- develop and apply management guidelines to control surface activity where required to protect cave values
- develop and apply management guidelines for public use of or conduct within caves where required in the interest of cave conservation, speleological research or public safety
- administer and support research activities by qualified persons or institutions to increase knowledge and improve cave management, and to review research proposals to prevent long-term adverse impact upon the cave/karst resource
- prepare cave management plans for those caves identified to require intensive surficial and/or user management
- monitor and review the above procedures to ensure their effectiveness and to provide a basis for revisions
- designate, where appropriate, specific caves as forest recreation sites
- review, prior to issuance, all forms of tenure for commercial cave/karst use

13.4 Responsibilities

The Ministry of Forests basic responsibilities in cave/karst management are set out in the 1981 government policy titled *A Statement of Crown Land Cave Policy and*

Branch

Administration. These responsibilities are to:

- develop Ministry of Forests cave management policy
- co-ordinate cave management policy and liaise with other agencies and provincial outdoor recreation organizations
- provide advice or assistance

Regions

- interpret cave/karst management policy and provide advice or assistance to districts
- develop procedural guidelines for districts and monitor district performance
- provide advice or assistance

Districts

- implement policy and procedures
- undertake cave and karst feature inventory projects in known karst areas where resource management plans are scheduled within a TSA and require licensees to undertake similar projects within TFLs (Section 6.2)
- maintain a district cave inventory (Section 13.5) concurrent with the recreation features inventory
- incorporate cave/karst management prescriptions into resource management plans
- designate, where appropriate, specific cave/karst features as Forest Service recreation sites
- approve management plans for specific caves
- issue Special Use Permits for the management of specific caves and/or karst areas
- approve memoranda of agreements for co-operative cave management activities with local organizations
- provide advice or assistance

13.5 Inventory

Cave and karst resources are inventories through the use of the Landforms or "L" feature of the recreation inventory (see Chapter 6 for a detailed description of these inventory procedures). For reference purposes, however, the Ministry of Forests basic procedures for cave inventory are summarized

Origins

below.

The Ministry of Forests cave inventory, classification and record system has been developed from the original "New Mexico System." That system has been used for a number of years in various areas throughout the United States. As detailed in *A Method to Manage the Cave/Karst Resources Within British Columbia's Provincial Forests*, and summarized below, the original New Mexico system has been modified to meet British Columbia conditions and supplemented with a classification category that rates a cave's appeal to both cavers and the general public. This modified version has been field-tested locally and is easy to apply.

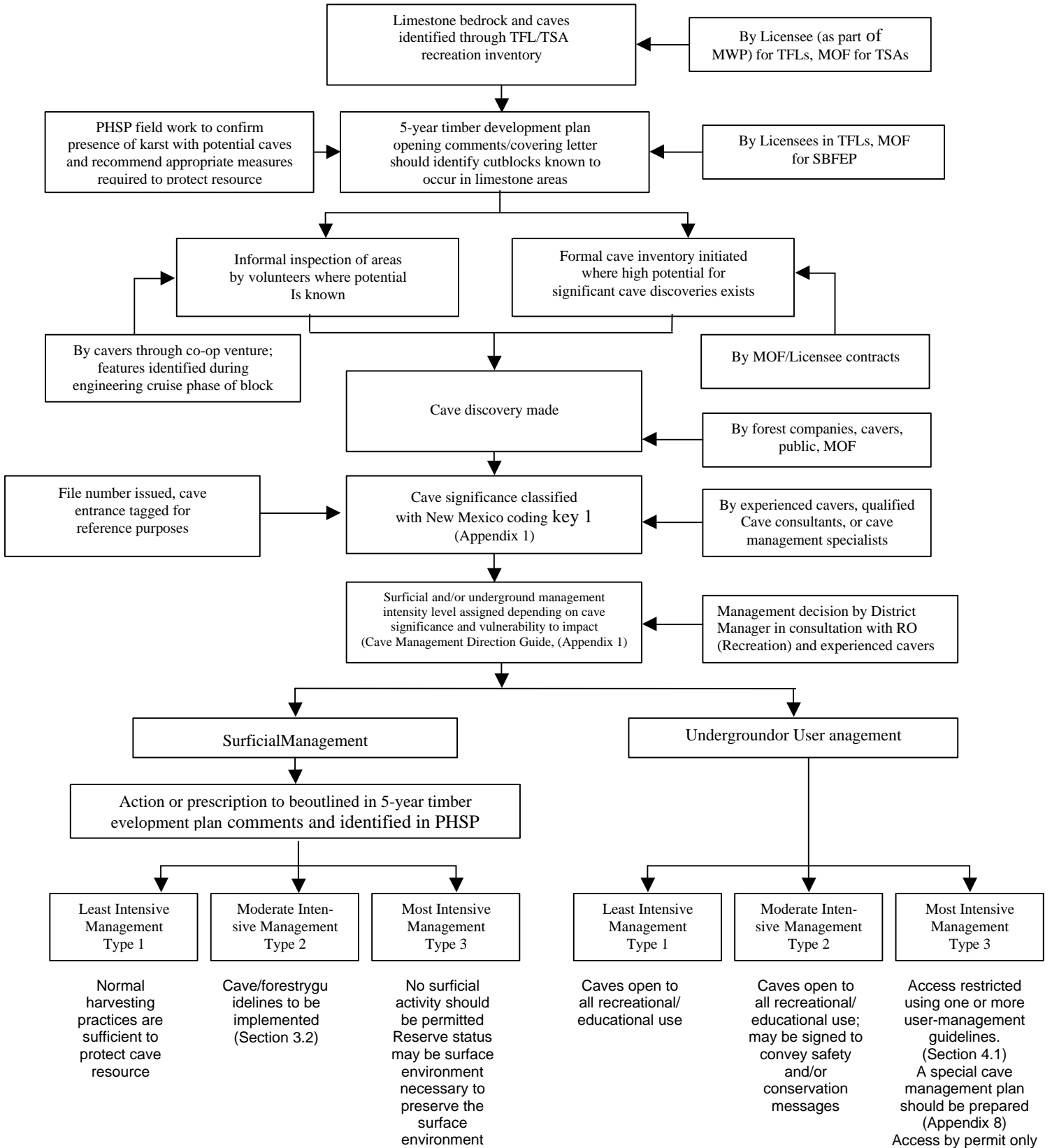
The Ministry of Forests cave inventory is composed of the following basic components:

- field assessment, including surface and underground inspections
- a cave inventory and classification card (FS 311) containing the cave name, location, description, classification and management type coded from a key list
- a reference or file number for each cave, to be used on each cave file and on a pin or tag placed at the entrance of the corresponding cave
- a master cave location map showing the locations of inventoried caves, together with a map showing general cave areas
- a permanent reference file on each inventoried cave, containing:
 - inventory and classification records
 - cave history
 - directions to cave entrance
 - photographs or slides
 - cave log (record of entries)
 - record of present or previous management activities

13.6 Management

Ministry of Forests Management of cave/karst resources is guided by the report, *A Method to Manage the Cave/Karst Resources Within British Columbia's Provincial Forests*. The management processes and responsibilities are summarized in Figure 1.

Figure 1 B.C.F.S. Cave Management Flow Chart



13.7 Liaison and Communication

In dealing with cave users and the general public, the Ministry of Forests should:

- encourage cavers to become organized among themselves and to act as a communications body for cave/karst management issues under Ministry of Forests jurisdiction
- encourage organized cavers to identify important cave issues and areas of geographic concern to the Ministry of Forests and forest companies
- encourage organized cavers and forest companies to establish direct communications to foster co-operation at the operational level
- identify to caving groups and forest companies the individual staff members at the district level whose duties include responsibility for cave/karst management issues and actions
- encourage these staff members to establish contact with local cavers and forest company representatives
- advise organized cavers of the potential for co-operative projects, such as cave inventory, mapping, use monitoring, guiding and interpretation through the development of adopt-a-cave programs, volunteer agreements and Special Use Permits.

13.8 Safety and Rescue

In order to promote public safety and minimize liability risks to the Crown, the Ministry of Forests should:

- inform the public of the general hazards associated with cave exploration (spelunking)
- inform the public and user groups of any particular hazards which might not otherwise be apparent
- communicate cave conservation and safety values to the general public through Ministry information and interpretive signs at appropriate caves under its jurisdiction
- where special dangers are known to exist in a cave, warn visitors in advance through written warnings (maps, guidebooks, permits, special agreements, signs posted at entry points, etc.)
- co-operate with local RCMP and caving volunteers in the event of search and rescue operations, and rely upon their expertise to provide search and rescue leadership
- publicize contacts (BCFS, RCMP, etc) for emergency use within managed caves
- have caving groups identify caves which may pose a hazard to road-building and logging operations

13.9 References

Cited References

A Method to Manage the Cave/Karst Resources Within British Columbia's Provincial Forests, Ministry of Forests, 1983.

Cave and Karst Management in Provincial Forests (draft), Ministry of Forests, Vancouver Region, 1986.

A Statement of Crown Land Cave Policy and Administration, Ministry of Lands, Parks and Housing, 1981.

Whitfield, P. 1979,. Modified New Mexico Cave Inventory and Classification System.

Forest Act

Ministry of Forests Act

Supplementary References

Larson, J. 1979. *U.S.Forest Service Proposed Region director for Cave Management.* Presented at Far West Regional Cave Management Symposium.