



BEST MANAGEMENT PRACTICES FOR PALAEOLOGICAL AND ARCHAEOLOGICAL CAVE RESOURCES

- Paul Griffiths and Carol Ramsey

FOREWORD by Carol Ramsey

In the September 2004 issue of *The ACKMA Journal*, Kent kindly ran an abbreviated version of *Palaeontological and Archaeological Cave Resources in British Columbia: – A Discussion of Management Issues*, which dealt with some of the issues around conducting archaeological and palaeontological research in caves in Canada's westernmost province.

As I noted in the previous article, excavating in caves is fairly new phenomenon in British Columbia (B.C.). Currently, this activity is completely unregulated except where archaeological material is shown to be present.

There is no cave protection legislation in B.C.; moreover, the researchers who conduct excavations and the management authorities who authorize such activities are often completely unfamiliar with the full spectrum of cave values and the kinds of impacts such fieldwork can have on caves.

The document below (aka "The Palaeopolicy") is intended to serve as a set of best practices guidelines for both researchers and management authorities in B.C. The first two drafts were authored by Paul Griffiths. Draft 3, below, incorporates feedback from archaeologists, various land managers, and fellow ACKMA members.

GENERAL

A cave management authority can authorize the study of palaeontological/archaeological resources in caves as part of overall cave inventory and evaluation activities, subject to the following best management practices:

1. Where applicable, the palaeontological/archaeological research activities in caves, including access, orientation for field personnel, reconnaissance visits, sampling, photo-documentation and georeferencing activities, research and excavation activities, removal and processing of sediments, removal, handling and curation of specimens, and dissemination of results should be planned in conjunction with the cave management authority(s).
2. Research activities in caves should be compatible with the cave management authority's cave and/or karst inventory objectives and priorities.
3. Research activities (including reconnaissance visits) in caves, should be undertaken by the minimum number of qualified personnel required, and should include persons with speleological knowledge and experience matching the technical difficulty and sensitivity of the cave.

This passage in K1 cave was subjected to high traffic during the 2003 field season. An indoor/outdoor cart was used to protect the substrate. Numerous repeat trips along certain routes were unavoidable during fieldwork



4. Alterations of caves, cave sediments and other objects during research activities or inventory must be consistent with requirements of the *British Columbia Heritage Conservation Act*, where applicable.

Orientation for Field Personnel

5. Before any reconnaissance, scientific sampling, or other research activities in caves are commenced, all field personnel should receive from qualified persons a comprehensive orientation or training session.

Topics to be addressed in this session should include cave safety issues, potential underground hazards, caving codes of conduct, and a thorough introduction to cave/karst conservation issues and concerns.

Geo-referencing and Photo-documentation of Palaeontological/Archaeological Resources in Caves

6. Cave resources of palaeontological/archaeological interest should be mapped and photo-documented prior to any handling, repositioning, testing, sampling, or collecting of specimens.

7. A map of the cave showing the locations and photos of the cave resources of palaeontological/archaeological interest should be submitted to the cave management authority as soon as possible after the field visit.

8. Photos and maps of cave resources of palaeontological/archaeological interest should be generated both before and after any research activity.

The following additional requirements should be met if scientific sampling or subsurface sampling of palaeontological/archaeological material in caves is proposed:

Surface Sampling in Caves

9. Sampling of palaeontological/archaeological material in caves should be initially restricted to the removal of a minimum number of representative specimens required for diagnostic and/or dating purposes, from the surface of the bedrock or cave sediments only.

When *Heritage Conservation Act* permits are required, sampling is to be consistent with the methodology outlined in the application for permit. No other sampling is permitted.

10. Protocols for handling specimens such that maximum scientific value is retained must be established in advance.

11. Casual cave reconnaissance visits are not normally to be combined with collection of palaeontological/archaeological materials.

The collection of any such material is a separate, planned, and authorized activity, which should only be carried out with the consent of the cave management authority and subject to a *Heritage Conservation Act* permit when required.

Research and Excavation Proposal:

12. Upon determining that additional testing, sampling, or excavation of palaeontological/archaeological resources in caves is warranted, the proponent should prepare a detailed research and excavation proposal, and submit the proposal to the management authority.

The proposal should include an analysis of potential impacts on other cave resources. (Note: Table 1 can be used as a guide for evaluating impacts of proposed activities.)

13. The impact analysis should be broad enough to include possible future research activities or expanded excavations within the cave.

14. The impact analysis should address the permanent curation of specimens removed from the cave, or how specimens are to be returned to the cave.

15. No permit for research activities involving subsurface sampling or excavation in caves should be issued until the cave has been inventoried and evaluated by qualified persons. At minimum, the inventory should address the sensitivity of the cave, or portions of the cave, to impacts that might result from proposed research activities, identify and document any unique or outstanding values, and identify any hazards to researchers. In the case of sensitive caves with one or more significant values, monitoring of research activities by qualified persons may be recommended.

16. The cave management authority should review the research and excavation proposal, consulting externally with other interested parties, if required.

Research and Excavation Plan

17. The cave management authority will select the preferred alternative, and a final research and excavation plan should be prepared in conjunction with the proponent. The final plan should outline the research and excavation activities, and the anticipated effects of the activities on all cave resources associated with the cave site, as well as monitoring activities.

18. The proposed research activities should be limited to specific cave passages or areas, so that other parts of the cave are maintained unaltered.

Fragile calcite dams in K1 cave



19. A reclamation plan, if appropriate, should be developed for the proposed excavation prior to approval. A reclamation bond should be established where appropriate.

20. Where applicable, the approved final research and excavation plan, including the reclamation plan and collections repository should be integral to any application for a *Heritage Conservation Act* permit.

Requirements for Digging/Excavation Activities in Caves

21. No digging or excavations in caves should occur until after the material in item 9 is dated and analyzed, and/or until it is demonstrated that the cave site warrants further sampling.

22. If the cave, or portions of the cave are deemed to be sensitive by qualified persons, photo documentation of the sensitive areas or features should be carried out prior to the commencement of research activities.

23. Maximum environmental proxy indicator information should be derived from the sedimentary matrices where possible, when processing cave sediments for palaeontological/archaeological material.

24. Wherever possible, a certain predetermined percentage of a given cave sediment deposit slated for excavation should be left intact for future research.

Effectiveness Evaluation

25. After research activities in caves are completed, a second round of photo-documentation and comparison with baseline conditions (photo-monitoring) may be required to determine the effectiveness of the impact reduction strategies.

Archaeological or Cultural Materials

26. If suspected archaeological or cultural materials are identified during an approved palaeontological excavation in a cave, the excavation in that area of the cave must be suspended, and the cave management authority and Archaeological Planning and Assessment, Ministry of Sustainable Resource Management consulted. It is likely that further excavation at that specific location can only be resumed after a *Heritage Conservation Act* permit has been obtained.

27. Palaeontological excavations in caves should be conducted in such a manner that the provenience and contextual attributes can be assigned to specimens identified as cultural during sorting and analysis.

Cave Management Plans:

28. From the impact analysis in item 12, the cave management authority should develop an individual cave management plan or prescription for the cave site being considered for research and excavation.

29. The cave management plan objectives related to research activities in caves should be consistent with the plan approved in item 17, and with other potential future research activities.

Dissemination of Results

30. Researchers should avoid disclosing or making reference to specific geographic locations when discussing or disseminating the results of their activities in sensitive caves.

31. Researchers involved in palaeontological/archaeological work in caves should adhere to both caving codes of conduct and professional codes of ethics, which should include the recognition of research precedence at cave sites and giving accurate and complete credit/acknowledgement where it is due.

DEFINITIONS:

Archaeological material: Physical evidence of past human activities, including the material remains of past cultures and environmental proxy indicators of human activities.

Cave: a natural cavity in the earth that connects with the surface, contains a zone of total darkness, and is large enough to admit a human. For the purposes of cave management, this term should also include any natural extensions, such as crevices, sinkholes, pits, or any other openings that contribute to the functioning of the cave system (Resources Inventory Standards Committee, 2003:72).

Cave entrance: The area surrounding the entrance to a cave, extending to the zone of complete darkness inside.

Cave inventory: the systematic investigation, evaluation and documentation of a cave and its full spectrum of values.

Cave management authority: The body that has administrative jurisdiction over the cave. Depending on circumstances, this could mean the Ministry of Forests, First Nations groups, federal or provincial parks, etc.

Cave management plan: A plan to manage the nature and use of a cave to maintain environmental quality and prevent its degradation. The plan normally includes goals and objectives, an inventory of cave resources, development and implementation of the management strategy to be used, and a provision for the periodic re-evaluation of the implemented strategy.

Table 1:
Determining the Significance of Effects on Cave Resources

ATTRIBUTE	DEFINITION
Direction	Beneficial effect on the cave resource (e.g., the restoration of a cave entrance) No change to the cave resource Adverse effect on the cave resource
Scope	Effect restricted to a small part of the cave Effect restricted to the immediate area of the action Effect extends throughout the cave system
Duration	Effects are significant for less than one year before recovery returns conditions to the pre-action level; or, for cave dependant biota, for less than one generation. Effects are significant for 1-10 years; or, for cave biota, for one generation. Effects are significant for greater than 10 years; or, for cave biota, for more than one generation.
Frequency	Occurs once only Occurs rarely and at irregular intervals Occurs on a regular basis and regular intervals
Magnitude	Minimal or no impairment of the cave system's function or process (e.g., for a inflow cave, the cave's unobstructed influent flow capacity; or, for an outflow cave, the discharge temperature range). Measurable change in a cave system's function or process in the short and medium duration; however, recovery is expected to be at pre-action level. Measurable change in a cave system's function or process during the life of the action or beyond (e.g., for cave biota, serious impairment to species productivity or habitat suitability).
Confidence	The general confidence level in the conclusion

Cave sediments: Clastic, chemical, [or] organic debris mobile in the natural environment during the life of the cave (Ford and Williams 1996:316). Cave sediments may be allogenic (i.e., comprised of material transported into the cave from the surface) or autogenic (i.e., originating within the cave itself).

Caver: A person who explores caves as a hobby or for recreation (Stokes and Griffiths 2000:90).

Impacts: Anthropogenic disturbances to a cave or its associated catchment which result in changes to its natural state or degradation of its values.

Impact assessment: The analysis of the impacts that a proposed activity or development, usually anthropogenic, will have on the natural environment. It includes assessment of long- and short-term effects on the physical environment, such as air and water, biology, as well as effects on aesthetics.

Karst: A terrain, generally underlain by limestone, in which the topography is formed chiefly by the

dissolving of rock, and which is characterized by karren, closed depressions, subterranean drainage, and caves (Stokes and Griffiths 2000:91).

Monitoring: Ongoing assessment of the condition of a cave, its environment, and its biota, utilizing various qualitative and/or quantitative techniques/devices such as photo monitoring, data loggers, turbidity meters, etc. The purpose is to detect and document changes in the cave or cave ecosystem.

Palaeontological material: Physical evidence of past life forms, including fossils, subfossils, moulds, impressions, track ways and other trace fossils.

Qualified person: A 'qualified person' means a person who, in the opinion of the cave management authority, is

(a) Qualified because of the person's knowledge, training and experience to design, organize, supervise and undertake a cave inventory,

- (b) Familiar with the provisions of these guidelines, prevailing codes of caving conduct and the regulations, standards, policies and procedures that may apply to caves in British Columbia,
- (c) Capable of identifying any potential or actual danger to human health or safety in the cave environment, and
- (d) Capable of identifying any sensitive, unusual or unique cave resources.

Reclamation plan: A mitigation plan designed to remove or minimize traces (to the extent possible) of research activities in caves, once fieldwork has been completed.

Rock shelter: A natural cavity in the earth, generally horizontal, that connects to the surface and is large enough to admit a human, but which does not contain a zone of total darkness.

Archaeological screening sediments in K1 cave. Cave sediments are a finite resource. It's important to maximize information yield from excavated sediments and to leave some undisturbed deposits intact for future researchers

Scientific sampling: the practice of obtaining what is hoped to be a small but representative portion of something larger, for the purpose of scientific study.

Speleologist: A person engaged in the scientific study and exploration of caves, their environment, and their biota (Stokes and Griffiths 2000:93).

Speleological: Pertaining to the scientific study, exploration, and description of caves and related features (Stokes and Griffiths 2000:93).

Speleothems: Secondary mineral deposits formed in caves, such as stalactites and stalagmites. Also known as cave formations or cave decorations (Stokes and Griffiths 2000:92).



REFERENCES

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