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The Archaeology of English Caves and Rock-Shelters: A Strategy Document

compiled by
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Summary

This document is intended as a stepping stone towards the development of an integrated English Heritage research, conservation and management plan for the archaeology of caves and rock-shelters in England. It presents an assessment of the nature, quantity, distribution and condition of the resource, identifying areas which need further research; and a review of the conservation and management strategies adopted by non-archaeological agencies with an interest in caves, and by other heritage agencies within Britain and Europe. This is followed by recommendations for an EH-funded project aimed at producing an audit of the known archaeology of England's caves and rock-shelters, and an assessment of the archaeological potential of: (a) archives from and deposits surviving in sites that have already been studied; and (b) sites not previously investigated archaeologically.

Keywords

Cave, Cave burial, Conservation, Reviews, Palaeolithic, Mesolithic, Neolithic, Bronze Age, Iron Age, Roman, Early medieval, Medieval, Post-medieval

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Introduction

This document presents a review of current issues in the conservation of and research into archaeological cave sites in England. It was stimulated by a number of proposals submitted to English Heritage (EH) for studying England's caves, notably by Andrew Chamberlain (Sheffield University), for a primarily desk-based national audit (Chamberlain *et al*. 2000), and Randolph Donahue (Bradford University), for a field assessment of the Pennines cave resource (Donahue *et al*. 2000). In response to these proposals, an internal EH strategy group was formed in order to discuss a coherent way forward. In 2002 the group, which includes Inspectors of Ancient Monuments (IAMs), archaeological scientists, curatorial archaeologists and academic researchers, produced a brief for a pilot project combining desk-based and fieldwork elements - and it is intended that a joint Sheffield-Bradford team will undertake this work, with EH funding, beginning in October 2003 (Chamberlain and Donahue 2003). The pilot audit and assessment, which it is hoped will be followed by a national 'roll-out', will provide a basis for developing detailed conservation and management plans and form a resource of knowledge useful to academic archaeologists, other groups interested in cave research and conservation, and the wider public (particularly the caving community).

The information presented below is intended to show that archaeological deposits in our caves represent a unique but fragile resource, much of which remains unknown:

- Caves are a unique type of site because of their depositional and preservational environments; the potential of new approaches to the study of archaeological deposits in caves, including advances in recording and scientific techniques, make an assessment of the resource timely.
- Caves are a finite and vulnerable resource: deposits and sites are disappearing for a variety of reasons, mostly caused by human activity; meanwhile the work of other agencies has shown that cave conservation requires active management based on good understanding. The development of co-operative conservation strategies will be particularly important.
- Cave sites are poorly understood, even at the level of baseline information about the presence or absence of archaeological deposits. It is likely that many still await discovery, while existing archives are often inadequately documented or publicised.

Cave archaeology: a review

Definitions

The term 'cave' is here taken to comprise any natural cavity in a rock formation large enough to accommodate a person. It therefore includes:

- rock-shelters and fissures;
- open dolines, sinkholes or vertical-entry caves;
- cave mouths and talus;
- caves with natural entrances which have been altered by humans.

Related categories of site, which are also discussed below, include wholly artificial caves (such as those beneath Nottingham) and mines.

The importance of caves

Cave environments, with their own micro-climates and localised sediment sources, which are often stable over long periods of time, tend to have enhanced preservation compared to open sites, especially of organic remains (e.g. better collagen survival in bones). In particular, cave entrances and rock-shelters are depositional environments (for sediments transported in) usually protected from erosion; the zone of accumulation frequently extends beyond the mouth of the cave and includes talus and colluvial deposits outside the entrance. Therefore caves and their immediate vicinity often contain a higher density and better quality of archaeological remains than the surrounding landscape. Even those sites without direct evidence of human activity may preserve valuable environmental evidence, commonly containing a greater variety of data and a longer sequence than open sites. Moreover, recent dramatic progress in scientific analysis (e.g. of biomolecules) will only increase the importance of the surviving cave resource.

Against this assessment of the particular importance of caves and rock-shelters can be set a growing realisation that they are 'dense taphonomic challenges that yield data on sequence and environments only to critical, disciplined analysis' (Dincauze 2000). Cave deposits often consist of a palimpsest of different phases of activity that took place at widely separated time intervals. Sediments reflect the disparate environmental conditions within the cave and their complicated interactions and post-depositional changes make interpretation difficult; the distinctive conditions that enhance preservation also make caves unsuitable as proxies for the broader, regional environment. Cave deposits are therefore best treated in their own terms, as evidence for local environments and the changes wrought by human occupation; hence the growing importance of 'intimate' techniques, such as micromorphology, in their analysis. So just as caves represent a unique resource in terms of preservation, they also present a unique analytical challenge in terms of archaeological methodologies and techniques.

Archaeological remains in British caves reflect the wide variety of uses these sites have been subject to, from domestic occupation to specialised functions (e.g. stores, workshops) to places of ritual and burial. To some extent these activities may be segregated according to the topography of the cave, ease of access and the presence of light. Hearths and occupation deposits tend to occur in the brighter and drier areas, as well as in more open rock-shelters, while deeper, less accessible spaces may have served as locations for burial and other rituals. The monolithic category of 'caves' can therefore be broken down into a diversity of settings and contexts. Although these sites may represent closed environments, human occupation of caves can only be understood as part of the landscape in which they are set. It may be useful to see caves as one aspect of a broader 'archaeology of natural places' (see below).

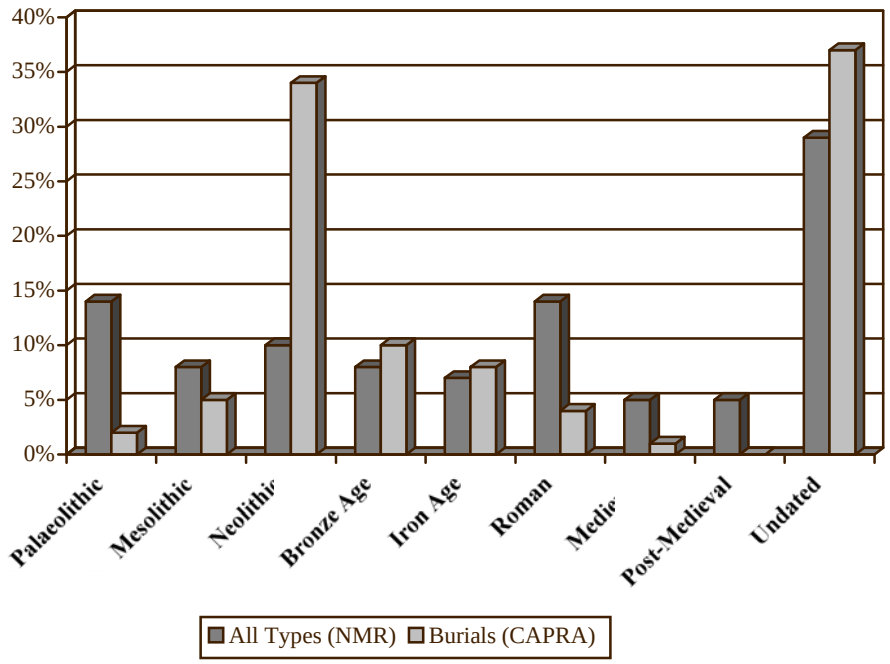
Although caves comprise an important part of the national Palaeolithic resource and the public image of a cave dweller is very much the Stone Age 'caveman', the great potential of cave deposits for preserving post-Palaeolithic archaeological evidence is not always appreciated; indeed the club-wielding caveman is a continuing visual cliché which the outreach aspect of an EH project should actively seek to dispel! Examples of the importance of caves since the Palaeolithic can be drawn from just about every period, for example:

- Mesolithic burials in coastal cave sites in Wales (e.g. Ogof-yr-Ychen, Dyfed);
- Neolithic burials in Foxhole Cave, High Wheeldon, Derbyshire;
- Bronze Age Food Vessels from a rock shelter at Goatscrag, Northumberland;
- Iron Age human remains, perhaps with evidence of cannibalism, from Alveston, Glos.;

- Roman occupation and ritual from Victoria Cave, near Settle, Yorkshire;
- Saxon remains from Reynards Cave, Dovedale, in the Peak District;
- Norse ship fittings in Smoo Cave, Durness, Scotland;
- Post-medieval (hermit) occupation of a rock-shelter at Carden Park, Cheshire (beneath which were Mesolithic deposits).

The fairly consistent representation of all archaeological periods within the known cave resource is shown by data from the National Monuments Record (NMR) (*Table 1*, left hand columns), which comprise 890 phases of activity recorded in 468 caves and rock-shelters (an average of *c* 2 per site).

Table 1: Cave occupation by period



Nevertheless, the cultural significance of caves undoubtedly changed over time. For the earliest periods, caves may have represented 'persistent places' in people's mental maps of their world (McNabb 2002); in later prehistory they show certain analogies with built monuments; while Roman-period use of caves frequently appears more pragmatic (see below).

In addition, there are numerous artificial caves which were excavated and used during the medieval and post-medieval periods; although the nature of their deposits may be rather different, these features face similar threats and management issues (see below).

Characterising the resource

Quantification

There are several thousand caves in England, with over 3000 listed on the Cave Database System maintained by the International Geographical Union. A pilot study by Bradford University (see Donahue *et al*. 2000) showed that known archaeological sites form a small proportion of all caves

and many have been severely impacted. However, field visits in the Malham plateau area of the Yorkshire Dales indicated that 10-20% of caves could contain archaeological deposits, and a similar figure has been recorded for other areas, e.g. the Manifold Valley of Staffordshire (Trent and Peak Archaeological Trust 1993).

The NMR database was updated and enhanced in 1998 through a desk-based audit - although this covered the archaeological literature only (inf. P. Everson). Of the 468 archaeological caves and rock-shelters recorded for England, 50 are Scheduled Ancient Monuments (SAMs), although many of these have a long history of research and have already lost most or all of their archaeological deposits (e.g. Gough's Cave, Cheddar), while their geological distribution reflects the *history* of research more than the *potential* of a particular area (see e.g. Craven 2002). Many smaller sites were also stripped or disturbed in the 19th and early 20th centuries.

The irony that the best protected sites are often those with least left to preserve is related to the fact that the majority of caves have never been inspected archaeologically, so it is likely that a significant part of the resource still awaits discovery. New caves and chambers are being discovered by cavers every year and it is impossible to quantify how much remains to be found: in terms of the geological resource Waltham *et al*. (1997) state that 'it is inevitable that further sites worthy of conservation will be discovered in future years'. They also note that remnants of Pleistocene sediments 'can survive in so many obscure corners of cave systems that a large proportion of caves could be considered as scientific resources worthy of conservation'. The implication for archaeology is that although the major sites and deposits will already be known about, many smaller ones remain to be discovered (A. Farrant, pers. comm.).

Distribution

Caves may occur in river valleys or on the coast, but are typically associated with landscapes called 'karst', a distinctive environment found on carbonate rocks (limestone, dolomite, marble) or evaporites (gypsum, anhydrite, rock salt) and characterised by landforms that are largely the product of rock material being dissolved by natural waters. Karst landscapes have a wide range of closed surface depressions, including caves, dolines (or sink-holes), solution pipes and hollows, as well as a well-developed underground drainage system and a paucity of surface streams. In England the largest area of karst is on the chalk of the south and east, although this has very limited cave development (the sea cave at Beachy Head, Sussex, is the only chalk site with a significant amount of accessible passage) and it is on the limestone karst where the majority of cave sites are found.

The most comprehensive recent general publication on British caves (Waltham *et al*. 1997) was an outcome of the Geological Conservation Review (see below). It identifies four areas in England with major cave systems, all in carboniferous limestone regions (*Fig. 1*): the North Pennines (where the geology has largely precluded the development of deep caves), the Yorkshire Dales (which has the greatest extent of cave development), the Peak District (with the largest unbroken area of cavernous karst but where drainage patterns have produced relatively few open caves) and the Mendip Hills (where the absence of glacial cover has permitted a complete record of Pleistocene sediments to accumulate). Significant outlying areas include South Devon and the Forest of Dean, while the southern tip of the extensive area of limestone that forms the Vale of Clwyd intrudes into England around Oswestry, Shropshire.

Fig. 1: Main areas of limestone karst in England (after Waltham et al. *1997, fig. 1.2)*

Beyond these areas, beach caves and rock-shelters can occur in other geologies, such as the Jurassic limestone of Portland and the sandstone outcrops of the Midlands (e.g. Cane and Cane 1986) and the Weald (e.g. Greatorex and Seager Thomas 2000). In addition, there are a number of areas, often also on soft sandstone, where artificial caves have been dug in historic times for various reasons: the best known are those beneath Nottingham (Waltham 1992) but there are examples as well in the east of England (e.g. Royston) and the south-east (Reigate, Hastings, Chiselhurst, etc.). Here, however, the distinction between caves and mines may become hard to sustain (e.g. the 'caves' of Bristol were originally sand quarries). Although mines have to be excluded from the present study simply by virtue of their numbers (e.g. some 25,000 mine shafts in Derbyshire alone), their conservation is a problem presenting similar challenges (see below).

Current knowledge

The need for a comprehensive record of cave archaeology is exemplified by the EH-funded *Creswell Collection Archive Assessment* project (1998), which concerns Creswell Crags Limestone Heritage Area, one of the most significant Pleistocene archaeological landscapes in Britain. Within the Heritage Area there are approximately sixteen sites associated with material of Palaeolithic date while other unexplored caves and rock-shelter sites have potential for further remains. However, even this important landscape lacked a collation of the results of previous work (the history of research; the range, size and condition of the archives) and an overview of *in situ* deposits (the range, condition and extent of material), both of which were considered essential for effective management of the resource in the future, such as the production of sensitivity surveys and conservation plans. A Management Action Plan for Creswell is now being developed.

The same problems apply to much of the national resource; for instance, McNabb (2002) states that the paucity of modern published data makes it difficult to assess the character of cave assemblages, while Myers (2002) has noted that in the East Midlands:

> The archaeological resource represented by upland caves and rock shelters have frequently received only interim reporting of the various excavations. Curatorial concerns for the preservation by record of many of these sites dictates that there should be a determined effort to conserve for future research the records from such excavations. Where deemed appropriate, projects to preserve and analyse such archives and publish the results should be considered.

The most recent all-period national review of cave archaeology in Britain was published over forty years ago (Jackson 1962), since when only a few audits covering specific areas, periods or material have been completed. Some of these have revealed serious biases in the published material. For instance, Murphy and Chamberlain (2002) have compiled a gazetteer of 44 Yorkshire Dales caves with identifiable non-human vertebrate remains, using records published in the scientific and recreational caving literature. This desktop survey demonstrates that only half of the caves with identifiable vertebrate remains have been recorded in the scientific media, and while the scientifically investigated sites are concentrated close to population centres and major routes, those reported in the recreational literature are located in more remote areas.

In many ways the archaeology of rock-shelters is even less well known, since they are of less interest to geologists or recreational cavers. They are also distributed far more widely, in terms of geographical area and geology, than the major caves. There have been no syntheses or general

studies of these sites in recent years yet, like cave mouths, they are a particularly important and vulnerable component of the 'archaeology of natural places'.

Moreover, even sites that have been investigated can not always be considered well-known. There is a great need for comprehensive and accurate records of known archaeological caves, not just of the sites but also of archives in museums and elsewhere (e.g. the University of Bristol Speleological Society collection): although the parent deposits may now be lost, much material still awaits proper assessment or re-assessment with modern techniques and methods.

Current themes in archaeological research

Palaeolithic

The tendency mentioned above to see cave archaeology primarily in terms of the minority Palaeolithic resource is evident in previous English Heritage policy. Palaeolithic caves alone received detailed assessment in a report prepared for EH and CADW (Welsh Historic Monuments Executive Agency) by N. Barton and S. Collcutt in 1986; this survey identified 72 English sites (and 34 in Wales) with some evidence for being genuinely Palaeolithic. The authors summarise the history of research since 1795 and the present condition of the resource, emphasising its diminishing nature and outlining strategies of prospection for new sites and conservation of existing ones (Barton and Collcutt 1986).

Since Barton and Collcutt's report, which indeed gives 'an impression of crisis', the study of Palaeolithic caves and rock-shelters has advanced in line with a new understanding of the period generally, including new excavations and continued work on existing archives. The significance of the latter is shown by Roger Jacobi's AMS dating programme which has revolutionised understanding of the Upper Palaeolithic sequence, confirming the abandonment of Britain at the height of the last glacial, *c* 20,000-16,000 BP. This has now been set in a broader, north European context (Housley *et al*. 1997). The famous burial at Paviland in Wales, previously dated within this hiatus, has now been pushed back to *c* 26,000 BP while human recolonisation of Britain has been dated at Creswell to *c* 13,000-12,000 BP.

At the same time a greater concern with taphonomy has revised our understanding of the scale of human contribution to faunal assemblages, for instance reassigning some Welsh cave deposits to carnivore activity, leaving only sporadic and impoverished archaeological assemblages at many sites. Sometimes old-fashioned curation and conservation policies, such as coating bones with varnish, can hinder reassessment, but small-scale excavation of surviving deposits at old sites is another strategy for enhancing understanding, e.g. Jill Cook's study of cut marks on human remains from Gough's Cave, Somerset (summarised in Charles 1998). The recent *Research Frameworks for the Palaeolithic and Mesolithic of Britain and Ireland* (Prehistoric Society 1999) emphasises the need to consider caves in the context of broader settlement systems, asking 'how do we compare activities which took place at caves and open sites, and place them within a differentiated settlement system?' The authors identify a need to agree national guidelines on the relationship between caves and open sites, including how to compare particular taphonomies and reconstruct landscape use. These developments in Palaeolithic studies also relate to recent attempts to develop a 'social archaeology' for the period, including new ways of thinking about cave sites (Gamble 1999, 75).

The presentation of these sites to the general public has also improved since Barton and Collcutt's report. For instance many of the errors mentioned in the information available at one of our most important sites, Kent's Cavern near Torbay, Devon, seem to have been corrected, if their website is anything to go by (see below, References). Meanwhile at Creswell Crags a new museum and educational facilities are planned.

Later prehistory

Apart from the Roman period (see below), there has been less systematic effort to collate, assess and present the more numerous post-Palaeolithic sites, presumably since caves represent only a minor component of the archaeological record from the Neolithic onwards (though the lack of serious study may itself mean that many sites have escaped detection or proper investigation). A notable recent exception is Chamberlain, Williams and Strenski's on-line *Gazetteer of English Caves, Fissures and Rock Shelters Containing Human Remains,* part of the Cave Archaeology and Palaeontology Research Archive (CAPRA) resource at Sheffield University (Chamberlain and Williams 1999). The database lists 174 sites, of which 64 (37%) are undated or only very vaguely so (e.g. Neolithic-Iron Age). The remainder suggest that the majority of burials from English caves are Neolithic or Bronze Age in date (*Table 1,* right-hand columns).

Caves have rarely intruded into theoretical discussions of social organisation or landscape in these periods, although recent work has begun to address the significance of natural places in the landscapes (e.g. Bradley 2000) and draw analogies between built monuments and some natural features: many chamber tombs, for instance, have cave-like interiors. The general category of caves also subsumes related types of subterranean feature that were sometimes treated in analogous ways to monuments. For instance, Jodie Lewis (2000) has studied the archaeology of 'swallets', basin-shaped depressions up to 30 m in depth, which are very common on the Mendip karst. They are caused - like the larger caves - by water solution activity (or occasionally ground collapse into underlying caves). Two swallets in particular, Charterhouse Warren Farm and Brimble Pit, were found to contain structured ritual deposits of human and animal remains, flint and stone work, and pottery. The latter includes the largest collection of Grooved Ware pottery yet found in Somerset; elsewhere Grooved Ware is frequently associated with structured deposits in pits and with ceremonial monuments such as henges. These 'vertical caves' therefore seem to have become significant places in the Later Neolithic-Early Bronze Age, analogous to built monuments. Indeed, some monuments, such as the Priddy henges, may have been deliberately sited in association with natural sinkholes (Bradley 2000, 88-9). Deposition in natural shafts also took place in regions without true caves, e.g. that excavated by Martin Green at Fir Tree Field, Down Farm, on the chalk of Cranborne Chase. The presence of a very similar but artificial shaft nearby shows the equal artificiality of categorically separating natural features from built monuments in this period.

There is also a relatively high number of Iron Age burials on the CAPRA database, which is interesting since this is a period when inhumations are rare on open sites - perhaps suggesting a rite peculiar to caves (and pits/shafts?).

Roman

Later periods are less well represented, though the concentration on burials in this gazetteer is not representative of the amount of Roman-period activity in caves in general: some 63 (36%) of the sites listed produced Roman artefacts in addition to burials of other periods. The Romano-British use of caves has recently been highlighted by the publication of a synthetic study (Branigan and

Dearne 1992) and a more detailed volume on Victoria Cave in the Yorkshire Wolds (Dearne and Lord 1998). This site, which was excavated in the 19th and 20th centuries, had an unusual finds assemblage; interpretation in terms of the general categories outlined in the earlier volume has suggested elements of both a workshop and a shrine. The gazetteer identified 75 English caves with good evidence for Romano-British activity (a similar number of sites to the Palaeolithic resource). Although this was a research project, not directly concerned with management or conservation, and has little to say about present conditions and future prospects, a number of important points relevant to the study of cave deposits of all periods can be gleaned, including:

- the poor state of archive material from old cave excavations, much of which has been lost;
- the importance of site visits, which were sometimes crucial to understanding how caves might have been used;
- the need to interpret cave sites in the context of broader local settlement systems and trading networks.

Recent caves

In contrast to the prehistoric sites, the Saxon and medieval 'caves' of Nottingham (also found in lower numbers at other towns fringing the Midlands basins) are entirely human-made (Waltham 1992). Although any pre-Norman caves have been modified beyond recognition, the surviving sites show evidence for use as storage places, factories, workshops and dwellings. The main threats to these caves are vandalism and natural or development-related roof failure. An updated register of the Nottingham caves has been compiled but many remain to be discovered and/or surveyed. As with natural caves, destruction and loss has been partly offset by new discoveries. In 1992 the city planning department had no formalised policy on cave protection, although sympathy with the caves and co-operation with archaeologists has improved over time. In contrast, the rock-cut houses at Kinver in Staffordshire have been subject to a comprehensive restoration programme by the National Trust. Clearly these sites have their own conservation issues but there is some overlap with the issues surrounding archaeological deposits in natural caves and they demand inclusion in any comprehensive audit of the resource.

Hermits' caves are another relatively recent phenomenon, dating between the 17th and mid-20th centuries. While some apparently reflect sincere decisions to renounce civilisation, e.g. John Harris, who occupied a rock-shelter (previously inhabited by Mesolithic hunter-gatherers 7,000 years earlier) in the grounds of Carden Park, Cheshire in the mid-18th century (Sinclair and Matthews 1999), other hermits were hired as 'an essential ingredient to the sort of Elysium sought by landscape designers of the latter part of the 18th century' (J. Milln, pers. comm.).

Caves in context

While recognising that caves form a special category of sites in many ways, it is therefore important not to divorce them from their broader landscape and cultural contexts. This point recurs in recent statements on caves of all periods, and is exemplified by the discussion of the Mendip swallets. Caves are just one among many types of natural landscape feature that may have been invested with significance by prehistoric and later societies. Bradley (2000) notes that in the landscape of ancient Greece caves were places where the outer world could communicate with the depths, the world beneath; they were also places of origin, the birthplaces of gods and heroes. The similar role of caves and rock fissures in Saami sacred geography suggests some common themes that may have their origins deeper in European prehistory, or possibly a human propensity for fascination with these places. But in any particular culture those attitudes to

natural places have to be contextualised. 'Votive' deposits in swallets, for instance, need to be understood in terms of the range of Neolithic and Bronze Age depositional practices found in other parts of the landscape, be they natural places, built monuments, or routes and boundaries within the human landscape of fields and settlements. Similarly, although rock art in England tends not to be associated with caves or rock-shelters (there are a few exceptions), it shows the importance attached to elements of natural topography in the prehistoric landscape.

The above discussion shows that our understanding of cave archaeology varies by period, although there is increasing recognition for all periods of the damage done by antiquarian excavation, the poor quality of surviving archives, the need to conserve what is left and the need to interpret cave sites within a broader context. Both Palaeolithic and Roman sites have been subject to recent audits, albeit with different purposes in mind; there is a greater need for systematic survey and synthesis to include later prehistoric and post-Roman cave archaeology.

Just as interpretation and analysis of archaeological caves have moved forward in recent years, so new techniques and methodologies for recording caves and their deposits have also been developed. The roles of micromorphology and biomolecular analyses have been mentioned. Other developments include new surveying techniques, such as the use of laser scanning (e.g. at the Grimes Graves flint mines: P. Topping, pers. comm.), ultrasound (Sellers and Chamberlain 1998) and virtual reality (Sellers *et al*. 2001).

Factors affecting the resource

The importance and relative scarcity of the known archaeological cave resource have been outlined, but the main reason why EH needs to address the conservation of caves more fully is the fragility of that resource. It is hard to quantify the loss but Price (1985) estimated that in the Mendips 16% of the total number of known caves in 1980 had already been lost. Threats to caves and their deposits come in a wide variety of forms, including attrition by human exploration, burrowing animals (particularly badgers), surface water run-off (especially where carrying pollutants such as fertilisers and slurry), rising sea levels and coastal erosion, landfill and waste disposal (which can bury sites and also release pollutants) and water abstraction from boreholes. Pollution can cause chemical deposition which obscures cave features and degrades habitats. Quarrying, mining and other developments may reveal new caves but can also completely destroy them (though partial destruction is more common) or change their climate; many karst landscape features have been lost without record to land reclamation and tipping. Ploughing and changes in agricultural practice can cause soil erosion and the deposition of sediments (including agrochemicals) in caves (Hardwick 1996).

External threats are, however, easier to 'police' than internal ones: the problems caused by human visitors include unnecessary damage and removal of sediments, collection of speleothems (stalactites, etc.) and fossils, graffiti, littering and the unintentional effects of trampling. Digging for new passages and chambers, an important aspect of cave exploration, inevitably threatens archaeological deposits. No strict legislation currently controls access to caves, or indeed any non-commercial activity taking place in a cave, even on Sites of Special Scientific Interest (SSSIs; see below), unless they are SAMs or restricted because of their bat populations. Without further assessment and prospection, it is clear that deposits of archaeological importance will continue to be lost without record. Historically, different regions of the country may have been differentially affected in terms of recent human interference. For instance, the early accessibility of the Peak District by rail has led to a longer history of destruction in this area, while the

discovery of many new caverns by lead miners was offset by the havoc they wrought in diverting water and dumping debris, etc. (Mellors 1985).

The conservation issues for archaeological caves are as great, if not greater than for 'cavers'' caves (A. Farrant, pers. comm.). The biggest threat is ignorance, with accidental destruction occurring through inappropriate development, quarrying and excavation (be it by amateur archaeologists, cavers or others). 'Natural' conservation may protect geological features like stalactites in inaccessible areas but evidence of human occupation is more likely to occur in the less restricted areas which are more vulnerable to visitors. In some areas, meanwhile, new threats have emerged: an archaeological survey of caves in the South Peak area of the Peak District was undertaken for the National Trust as a response to the impact of cavers, but the monitoring system set up at the time now shows that badgers are the major problem (see below).

Cave conservation and management

This section summarises current approaches to managing caves adopted by conservation and caving organisations in England. The two main issues for EH are what can be learnt about conservation and management from work already undertaken by these agencies, and what existing audits/databases an archaeological audit should take account of (in terms of both accessing relevant information and ensuring compatibility). Conservation issues can be broadly divided into general management problems, which are shared with all other environmental agencies looking after caves, and specific concerns relating to the preservation of the archaeological resource. In the latter cases we can still learn from other organisations with archaeological interests and those with particular expertise in managing quaternary geological deposits. The specialised nature of cave archaeology makes the need for both a base-line assessment of the resource and co-operation with other agencies with expertise in cave studies unassailable.

Previous EH conservation initiatives have paid little attention to caves, especially post-Palaeolithic sites. The Monument Class Description prepared for the Monuments Protection Programme (MPP) by Nick Barton is entitled *Caves and Rockshelters (Palaeolithic). Exploring Our Past* (English Heritage 1991, 50) makes reference to 'a survey of known cave deposits', presumably Barton and Collcutt's (1986) above-mentioned report, which only deals with the Palaeolithic resource (i.e. previously excavated sites with demonstrable evidence of Palaeolithic activity). Otherwise this document makes most of the right noises: scope for an assessment of the nature and extent of surviving cave deposits across the country; the need for a sound foundation on which to base scheduling decisions; the need for action to conserve and interpret cave sites in conjunction with bodies like English Nature (EN). However, ten years on, these proposals have not been systematically implemented. The Monuments at Risk Survey (MARS) main report (Darvill and Fulton 1998) makes no reference to caves, despite their being one of the most scarce and fragile of site types, while *Exploring Our Past 1998* is more concerned with Palaeolithic open-air sites, as a result of the *English Rivers Palaeolithic Project* (from which caves were specifically excluded): the previous draft *Research Agenda* (1997) records a total of £509.70 spent on the monument class assessment of caves and rock-shelters compared to over £280,000 on other Pleistocene deposits.

Wenban-Smith (1994) has explicitly considered the management implications of the point made earlier that archaeologically sterile deposits containing environmental and chronological information are a key part of our heritage, and particularly so for the Palaeolithic. These are often bypassed by existing archaeological management practices. While, as Wenban-Smith makes clear, caves are the only part of the Pleistocene heritage which can be protected by scheduling, many of his concerns about the need to protect archaeologically sterile deposits, the lack of skills within commercial archaeology units for dealing with Quaternary deposits, and the absence of a basic inventory of the evidence apply equally to caves and rock-shelters. A similar point has been made by S. Aldhouse Green in a letter to *British Archaeology* (1998):

> Under present practice caves cannot be given the protection of scheduling unless they have actually produced evidence of human presence. In other words, the only way to gain archaeological protection for such sites, which have become an increasingly precious resource, is to dig a hole in them. There are, I believe, strong grounds for protecting all caves where Pleistocene deposits are known or strongly suspected.

Given their interest for various groups, caves require careful effort to ensure they and their fragile biological, geological and archaeological resource are conserved for all to enjoy and study - with the caveat that those two concepts are not automatically compatible.

The caving community

A recent estimate suggests that there are up to 30,000 cavers in Britain (see Glasser and Barber 1995). The early history of cave conservation is outlined by Wilmut (1985), who also makes clear the ambivalence of many cavers to conservation issues, professing support in principle but becoming dismayed when it requires the management of their activities. 1985 was designated 'Cave Conservation Year' and provided an opportunity to discuss the issues, as then perceived, in the journal *Studies in Speleology*. The papers here show something of the debates taking place in the caving community. For Davies and Long (1985), education was seen as the key; access control might help preserve individual caves but would inevitably simply transfer the load to other sites. For Price (1985), education was not a solution by itself; the most effective protection in the Mendips was at those caves with leader systems (where responsibility for looking after the cave falls on a specific individual). Judson (1985), in contrast, argued for the need for access control to the most vulnerable locations. Some of these papers are reproduced or updated in the National Caving Association's *Cave Conservation Handbook* (see below).

National Caving Association (NCA)

The NCA is the main body promoting recreational caving in Great Britain, essentially comprising a confederation of regional councils of caving clubs. Its ethos is that cavers should actively promote conservation and sound management practices through example, education, advice and training. It has a Conservation and Access Committee, who are doing relevant work in two areas. The first is the development of a Cave Conservation Policy based on site-specific Cave Conservation Plans (CCPs), fitting guidelines outlined in their *Cave Conservation Handbook* (NCA 1997). So many individual plans are needed that wider audits have been undertaken, for instance in the Peak District (see below) where a site inspection report form has also been prepared.

The NCA has good links with English Nature and the Joint Nature Conservation Committee (JNCC; see below), both of whom support the use of CCPs, and it can be suggested that cavers

are more aware of the biodiversity aspects of conservation than the archaeology. The *Cave Conservation Handbook* (CCH) gives sensible advice on the importance of recording archaeological remains, emphasising that stratigraphy may not be level, that the spatial distribution of artefacts and bones is important, and that even 'a few flints or fragments of pottery' are worth recording and reporting (NCA 1997). However, the sections on 'Geological Potential', 'Cave Biology' and 'Bats Underground' are much more full, authoritative and better referenced. The recommendations on the 'Discovery of Palaeontological and Archaeological Remains' are rather vague and weak, putting the onus on cavers who are digging to record finds and then 'tell an archaeologist'. Only on SAMs and SSSIs is digging without prior permission not permitted.

The CCH usefully evaluates different methods of conservation in the following terms:

- Secret Conservation (i.e. not publicising discoveries - seen as 'totally inappropriate');
- Restricted Access Conservation (see below);
- Positive Conservation (the preferred option, including formation repair, taping and walling, but principally based on education).

However, once again specific examples of conservation strategies focus on geological formations, and more detail is needed on the conservation of archaeological remains.

Access (or its restriction) is a key issue for the NCA because the conservation of caves has to be balanced against the desire of the caving community for their continued use; entry systems have to be seen to be fair, while gates can have an adverse impact and cause damage to cave entrances themselves (probably the most likely location for archaeological deposits). Although the NCA supports moves to encourage novice groups to avoid sensitive caves it also argues that the conservation interests of specific sites might have to be 'sacrificed' to recreational interests; caves selected for such use should have high educational value and present examples of the need for conservation. Show caves are another means of preservation, though only if conservation rather than commercialism is the primary objective; most present 'show caves' are in general poorly preserved for this very reason.

The second important area of work by the NCA is the development of a GIS-linked database, termed the *National Cave, Karst and Mine Register*. At present no co-ordinated system or depository exists and information is often hard to track down. The intention of the database is to provide information relevant to conservation, recreation and research, serving as:

- a resource for planning applications and sympathetic management of sites;
- a central depository for CCPs, scientific data, etc.;
- a means of assessing potential conflicts between conservation and access needs;
- a means of studying biodiversity;
- an extension of opportunities for recreation, but with an emphasis on conservation and safety.

The database has been developed in Visio and runs in Access with links to data in MapInfo. The use of GIS is seen as beneficial for visual information, simulating impact assessments and assessing the exploration potential of sites. The aim is to make the database compatible with those developed in other countries, through liaison with the Informatics Commission of the International Union of Speleology (see below); also with the national Geological Sites Database, used by 29 Regionally Important Geological and Geomorphological Sites (RIGS) groups (see

below), and the inter-agency Earth Science Database developed by the JNCC, EN, the Countryside Council for Wales (CCW) and Scottish Natural Heritage (SNH) to maintain records of 3000 Geological Conservation Review sites that will eventually be designated Sites of Special Scientific Interest. The National Register project is supported by EN, CCW, JNCC, SNH, the Geological Society, Brecon Beacons National Park and the Yorkshire Dales National Park. Partnership projects have been undertaken with Mendip (karst data on MapInfo), Dorset County Council (limestone quarries on Portland) and Brecon Beacons National Park (Black Mountain cave register - accessible online). Specialist data for the National Register will be collected by experts in the appropriate fields and the database is intended to include some archaeological records, although only from publications acquired through the British Cave Research Association (see below).

While the register does now hold basic data on over 4000 caves and some (access-related) information is available online, internal problems in the NCA and reluctance from some regions to make information available nationally have hindered the development of the registry (G. Price, pers. comm.). The promised archaeological data has not yet been received, nor has the site data been fully linked to the background mapping. A separate organisation dedicated to the project is now being formed and work is ongoing to add detail to the database. Meanwhile a more limited Registry project appears to have restarted within the NCA (see http://www.registry.nca.org.uk).

Derbyshire Caving Association (DCA)
While the NCA deals with conservation policy issues, their implementation in practice usually falls to the regional associations, the most active of which appears to be the DCA. A Mission Statement for cave conservation was published by their former Conservation and Access Officer, Tony Gibbs (2000). Gibbs argues that conservation should not be an excuse for excluding visitors, unless there is scientific justification. However, along with access comes responsibility: sustainability and minimal impact are the keywords. Blanket policies may not serve the unique condition of each site - so the development of individual CCPs is important, based on discussion between the different interest groups. An example of such a co-operative approach would be the case of a mine where industrial archaeology interests wished to see the replacement of ladders in original materials and cavers therefore shifted to engine- or hauling shafts for their pitches.

In 1999 the DCA jointly published with EN a leaflet entitled *Do You Dig Caves?*, which explained the location of all the SSSIs in the Peak District and procedures for digging in those sites with legal protection. They also undertook the *Masson Cave Audit*, again supported by EN, which proposed the active maintenance of passages and associated natural hydrologic systems; the establishment of regular monitoring; the promotion of good practice among cavers; and continued partnerships between EN, landowners and cave users.

British Cave Research Association (BCRA)
The BCRA is a registered charity whose object is to promote the study of caves and associated phenomena. The Association is also a 'representative body' for individual cavers within the National Caving Association. Their Special Interest Groups (SIGs) allow members to associate and communicate in a more detailed way than would be possible amongst the general membership of the BCRA. The BCRA used to have an archaeological recorder, but this post apparently lapsed some time ago. Several people have expressed an interest in setting up an archaeology SIG but, as yet, such a group does not exist within BCRA (R. Rushton, pers. comm.). However, Andrew Chamberlain of Sheffield University (one of the applicants behind

the cave audit proposal to EH) is their contact on archaeological issues and BCRA sponsors the on-line CAPRA journal (see above). Conservation issues are dealt with in the first instance by the NCA and the Regional Caving Councils; BCRA's Conservation Officer liaises with these where there are scientific or research considerations. Currently the BCRA is proposing to 'consolidate' with the NCA, whereby the BCRA will drop its 'national body' activities and concentrate on being an organisation for cave research.

BCRA has also put forward plans for a Cave Heritage Centre. It states that there is a serious lack of understanding of what caves, cavers and caving are all about and a need to capture peoples' imagination. This can be achieved through the public presentation of a cave in an exciting, but sensitive and conservation-conscious manner. The message of Cave Conservation is a difficult one to get across since caving is often dark, wet, cold and muddy. In proportion to the land area there are considerable limestone resources in the UK but the country lacks 'a shining example of a really well-conserved cave' comparable to (e.g.) Altamira (Spain), Lascaux (France) or Punkva (Czech Republic). Some form of cave/karst research establishment would also help avoid splits between the recreational and scientific elements of the caving community.

Cave archaeology was the subject of several papers in the BCRA journal *Cave Science* in 1989; in particular Charlotte Roberts (1989) sought to convey the value and relevance of archaeology to cavers. She notes that many cavers feel archaeology is reserved for the rock-shelter type of cave which sporting cavers tend to avoid in favour of more challenging sites; the corollary is that cave archaeologists (and other scientists) do not need to be expert cavers - enhancing the lack of understanding between the two groups and leading to fears among cavers that archaeologists would seek to prevent digging into caves. To remedy these problems of perception more exchange of information is needed.

International Union of Speleology (UIS)
The UIS is the international body for caving and speleology. Formed in 1965, its voting members consist of a delegate from each member country. There are a number of Commissions and Working Groups through which UIS's speleological work is done. These include the Commission for Protection, Management and Tourism in Caves and Karst Regions, the Archaeology and Palaeontology in Caves Commission, and the Informatics Commission, which organises a 'Cave Data Exchange Format Working Group'. This latter group is working on an exchange and archiving format for cave and karst data (hardware- and software-independent), initially concentrating on data relating to cave surveying and mapping; the data format will be designed for use with the speleological data field definitions published by the UIS Field Definitions Working Group. The UIS archaeology and palaeontology commission was set up in 1993 with the goal of giving scientists and cavers an opportunity to meet and exchange information. They have organised and promoted conferences about cave archaeology and palaeontology in the USA, Germany, Switzerland and Brazil; the next event will take place in Athens in 2003 (inf. R. Hapka).

Nature conservation agencies
As well as providing shelter for humans, caves also furnish ideal habitats for a variety of fauna and flora. Rare and unusual animals and plants in English caves include species of mosses, ferns and liverworts, crustaceans (e.g. the cave shrimp) and several species of bat. Biodiversity is a key concept underlying current nature conservation strategies implemented by EN and the JNCC in the form of Biodiversity Action Plans (BAPs). The Report of the UK Biodiversity Steering

Group does not contain a Habitat Action Plan specifically for caves, karst or mines and this also appears to be missing from many relevant local plans; however, EN has acknowledged (in *Tranche I Action Plans*, 1995) that caves and natural rock exposures are a gap in their broad habitat classifications and will be reviewed for possible inclusion. Meanwhile, caves have been considered as separate habitats in a few cases. For instance, the *Devon Biodiversity Action Plan* for caves, karst and mines emphasises their importance, including archaeological interests (although unlike the biological and geological information, little detail is given). Current problems facing these sites are outlined, along with positive initiatives and a variety of objectives, including the establishment of:

- an inventory to improve understanding of the resource;
- appropriate access arrangements and site-specific management plans;
- a liaison network with interest groups;
- greater public understanding through access to certain sites;
- educational programmes at show caves and interpretation programmes at appropriate target sites.

In the same region, *The Nature of Dartmoor: a Biodiversity Profile*, produced by EN and Dartmoor National Park, emphasises the need for a Conservation Plan for caves in the Buckfastleigh area which safeguards the remaining cave sediments, formations and fossils. This is part of a more general programme to identify, maintain and enhance rock exposures and natural landforms, and to encourage public appreciation of the landscape. The Dartmoor *Habitat Action Plan for Rocks* (including caves) has various objectives including the establishment of a geological database on GIS integrated with wildlife and archaeological data and the production of a 'Guidance Note for Geological Fieldwork on Dartmoor' referring to potential biological and archaeological importance.

Similar BAPs are under development for the Peak District, the Mendips and the Yorkshire Dales. From the national website it is unclear how much attention is paid to caves or archaeology generally but the DCA is a partner in the Peak District BAP, and a local Habitat Action Plan has been prepared for caves in the Yorkshire Dales.

Geological/quaternary groups

Caves are particularly important for geologists as they reveal rock formations and geological processes that would otherwise remain hidden. They are also a source of minerals, some of which occur nowhere else, and many cave systems are associated with our mining heritage. Coastal solution caves have revealed the longest and best levels of Quaternary sea level variations in Britain, while speleothems (stalactites, etc.) can provide information on climate and groundwater chemistry going back half a million years. Many caves without direct evidence of human occupation have important palaeontological evidence of Pleistocene faunas from a range of different climates spanning the warm interglacial to the cold glacial.

Joint Nature Conservation Committee (JNCC)/English Nature (EN)

The JNCC is the government's UK-wide wildlife advisor; its components are the national bodies such as English Nature. The responsibilities of the JNCC also include earth heritage, however, primarily through the publication of the *Geological Conservation Review* (GCR) volumes. The GCR was a systematic selection exercise carried out across Great Britain between 1977 and 1990,

identifying candidate geological sites for designation as SSSIs. One of the blocks within which sites were assessed was *Karst and Caves of Great Britain* (Waltham *et al*. 1997).

The specific work of geological conservation is carried out by EN (see below) and the other national agencies. The JNCC's *Introduction to the Geological Conservation Review* (on-line) gives a short history of earth heritage conservation and a summary of conservation strategies. The major milestones in legislation were the *National Parks and Access to the Countryside Act* 1949, which created the concept of SSSIs, and the *Wildlife and Countryside Act* 1981 which improved their conservation arrangements. A detailed series of conservation guidelines for various site scenarios was produced at the end of the GCR, in the form of the *Handbook of Earth Science Conservation Techniques*.

The JNCC also manages the *Inter-Agency Earth Science Database* (IAESD) which contains brief descriptions of the geological interest of individual GCR sites intended for use in SSSI notification. The coming two years should see the establishment of an effective and flexible database for updating and disseminating Earth heritage information held by JNCC.

Geological conservation is an integral part of EN's work and it takes a lead in protecting caves. About 30% of SSSIs (some 1300) include a notified geological interest, while 55 cave and karst sites have been designated SSSIs. Waltham (1983) has outlined the need to compromise between conserving just a few caves as representative or every cave as a unique and irreplaceable site. The final selection was based on the notion of defending a site in a Public Inquiry situation when there was a conflict of interests - to fail to defend one would weaken the status of others, yet not designating a site could be seen as writing off its scientific value. The criteria therefore comprised: quality and rarity of the site; the scientific value of its geomorphological record; the comprehensive value of the site as a whole.

Most cave SSSIs are considered 'integrity sites', i.e. they exhibit features which are finite and irreplaceable if destroyed (as opposed to 'exposure sites' which are extensive or well-developed below the ground). Conservation of integrity sites focuses on preservation, with restrictions against human-made changes. Since January 2001, the new *Countryside and Rights of Way Act* gives EN much greater powers to take legal action against individuals who cause damage to SSSIs, finally strengthening the 'pathetically weak' conservation law as previously framed (Waltham 1983).

While the threat of large fines may act as a deterrent, it is considered preferable that all collectors develop an ethical and sustainable approach to collecting. The co-operative ethos is exemplified by the *Fossil Collecting Code* for the West Dorset Coast, co-ordinated by the Jurassic Coast Project, which has been written with particular regard to the extraction of fossils from sea cliffs and the recording of important finds in a register. While such schemes are clearly more appropriate for exposure sites, since in caves no collecting can really be called sustainable, there may be lessons we can learn about the usefulness of a co-operative approach. According to Andy King, a senior geologist with EN, 'the Code promotes a responsible and sensible approach to fossil collecting, raises awareness of positive site management and encourages closer working between everyone involved.'

Although developing site management strategies (including documenting the importance of the site, planning and implementing practical conservation and protection measures, site monitoring

and site enhancement) was not part of the GCR, such strategies are a necessary extension of it. EN's geological conservation strategy, *The Past is the Key to the Future*, provides a guiding framework for moving geological conservation into a more integrated, promotional and participative phase and may be a useful model for archaeology. Management has to be sustainable and of high quality to safeguard the geological SSSI series; thus EN supports the JNCC in publishing the GCR volumes and maintaining a Britain-wide GCR site database. Developing and exploiting links is important, e.g. between geological conservation, landscape and wildlife interests (archaeology is not specifically mentioned), as is looking for industrial sponsorship of geological sites and developing new training programmes to raise awareness amongst audiences both outside and within EN. The knowledge gained can then be used to incorporate geological issues into conservation policy documents.

An example of EN's approach to geological conservation of a cave site is the management work carried out at Banwell Cave, Somerset, a Pleistocene bone cave which was being damaged by fungus. The work combined rescue excavations, which had clear research benefits, with the drawing up of a cave management plan that recommended ways of enhancing and promoting the cave, including a permanent exhibit of the bones and rock strata. The latter aspect exemplifies EN's support for cave conservation through education, with cave users ultimately having to take responsibility (Glasser and Barber 1995). They too have promoted the use of CCPs, which involve a four-stage process of:

- documenting the scientific interest of the cave;
- describing pressures and threats to the cave;
- recommending practical conservation measures;
- monitoring to assess the effectiveness of the conservation measures.

EN has provided funding for caving groups to produce these plans themselves so that they retain 'ownership'. An example is that for Knock Fell Caverns in Cumbria which recommended access by permit for experienced groups only, the provision of documentation to visitors showing recommended routes, etc., and taping off sensitive features.

Regionally Important Geological and Geomorphological Sites (RIGS)

RIGS, which were established in 1990 by the Nature Conservancy Council, are assessed and often managed by local, volunteer groups, actively supported by EN. The philosophy of local, public 'ownership' with administrative support from an organisation provides another model for co-operation and raising awareness. RIGS do not have formal statutory protection in the same way as SSSIs but can be listed on local authorities' development plans. In Devon, for instance, there is a non-statutory designation of *County Geological Sites* designed to conserve locally important sites and to enable more people to become involved in Earth heritage conservation. The distinction between RIGS and SSSIs may reflect educational and/or aesthetic appeal rather than strict scientific interest; geological sites of local importance for their archaeology (or their flora, fauna, etc.) may also be protected as RIGS. The RIGS scheme complements the GCR. However, as with the cave registry initiative, while geological site recording and conservation are well established in the UK, the collection of information remains poorly co-ordinated and data standards ill-defined. Many groups record sites using the GD2 database, which was written to manage data from the National Scheme for Geological Site Documentation; this is long overdue for redevelopment but has been held up through lack of resources.

British Geological Survey (BGS)
While the BGS is not actively involved in the conservation or management of cave sites (which is done mainly by EN, local RIGS groups, other organisations such as caving clubs, and local archaeological and natural history groups, e.g. the William Pengelly Trust in Devon) there are many informal links with individual BGS staff. The BGS is also in the process of compiling a national database of karst and cave features as part of its 'geo-hazard programme'. This is being held in ArcView GIS format, and essentially lists the locations of caves, springs, sinkholes, streamsinks, etc., with data on location, type of cave, lithology, size, etc. They have no provision at the moment to include any information about archaeological deposits, except as a short bit of free text. However, although the database is in the early stages of development, there may be scope for some data exchange and the BGS is in a position to obtain and review information on the location of archaeological deposits in caves held in caving club libraries, its own holdings and other data sources. The BGS has recently completed a similar data gathering exercise as a contract for EN, to assess the 'features of scientific interest' in cave SSSIs (inf. A. Farrant).

National heritage agencies

The National Trust (NT)
The NT, whose remit is to manage land 'for the benefit of the nation', is responsible for looking after some cave sites. These include the caves of the Manifold Valley in the White Peak, which lie within an SSSI and many of which have archaeological significance. Threats identified in the 1980's included the deliberate disturbance of archaeological deposits by cavers and others, erosion by visitors and climbers and disturbance by mammals (foxes, rabbits and badgers). This led to a proposal to survey the Manifold sites, work which was undertaken by the Trent and Peak Archaeological Trust in 1992. A total of 59 accessible caves (not including some potential sites indicated by narrow fissures) were listed but only 23 were fully recorded. Nevertheless the work led to an unambiguous NT policy on cave preservation, with regular and frequent monitoring, though expensive, seen as essential; a voluntary code of conduct was also established between the NT and the Derbyshire Caving Association, which provided the cavers with a sense of ownership and responsibility and led to a joint CCP for Dafar Ridge Cave and now a draft Recreational Cave Management Plan.

Today the monitoring programme has ten years' worth of data on disturbances to cave entrance areas (J. Malley, pers. comm.). The monitoring has, as mentioned above, highlighted badgers as the major current problem causing a finite resource to disappear, while recreational cavers are no longer a real issue (the relationship with DCA is good and specific 'people problems', such as at the SSSI of Foxhole Cave, High Wheeldon, have been solved by controlling access through gates). Although most of the large cave resource in this area has already been examined there are unexplored archaeological cave deposits, some of which are among those being destroyed, e.g. a human femur has been found in badger spoil at one site.

Historic Scotland
Historic Scotland has been involved in numerous conservation plans and grant-aided cultural resource management work for specific sites, e.g. East Wemyss; Inchnadamph, Sutherland. It has supported the recent publication of Chris Tolan-Smith's *Caves of Mid Argyll* (2001) and commissioned a survey of caves in the Oban area. Excavations have also taken place at Covesea Cave, Moray, by Ian and Alexandra Shepherd, though have not yet been published (inf. P. Ashmore).

A recent study by John Finlay Associates for the conservation, management and presentation of Smoo Cave, Durness, Sutherland, followed earlier excavations by Tony Pollard (inf. N. Fojut). The site is a sea cave which has the largest cave mouth in the UK and a dramatic inlet setting; it is a SAM, a SSSI and a show cave. However, the current facilities 'do little justice to the potential of the cave and its coastal context': while the site has important Mesolithic remains (a shell midden) currently this 'just looks like a pile of soil' (this may of course be a problem of education as much as presentation!). The report states that the key themes of geology, archaeology and natural history need to be linked to the development of other visitor opportunities in the context of a sustainable management plan. The key theme is the empowerment of the local community, while archaeological excavations are also considered a 'mandatory enabling activity that must be completed before any development takes place'. The report considers how to turn the cave into a properly managed and interpreted visitor attraction; however, there is no specific consideration of the conservation issues related to the impact of those visitors on the archaeological, geological or natural environment.

CADW

CADW published the Welsh part of Barton and Collcutt's report (unlike EH) and used it to complete a scheduling programme of Palaeolithic sites in Wales. Such sites (and post-Palaeolithic caves) are now dealt with on a case by case basis (inf. L. Fiddes).

Conclusions and recommendations

Summary of review

A number of points can be drawn from this review. First is the undervaluing of much later prehistoric and historic cave archaeology in England, such that sites are marginalised and rarely appear in academic texts (the CAPRA initiative is a notable exception). Recent academic emphasis on structured deposition and the use of natural places, particularly in studies of the Neolithic, Bronze and Iron Ages, demands that information on burials and other deposits in caves, rock-shelters and other karst features be more widely publicised, so that the potential of post-Pleistocene caves is better understood. The EH project therefore needs suitable accompanying publicity within the broader archaeological community, not just among those curators concerned with caves and rock-shelters.

The second major point is that our understanding of the resource and how to manage it lags behind other agencies, such as EN, although for many archaeologists outside EH (e.g. at the National Parks) there is a clear understanding of the issues - but not necessarily the funds to address them or gather basic data. The other UK heritage agencies also seem to lack an overall strategy (more research is needed to assess European approaches). In Britain, the work of the environmental agencies, both geological and biological, provides models in terms of management plans, databases and strategies of co-operation with recreational caving groups. It makes sense to have integrated management plans for priority sites and landscapes. In many cases, archaeology could easily be slotted in as a key component of such plans; in practice, it is often mentioned but with far less accompanying information than for the geology and biology, either because it is not available (i.e. the basic collation has not been done) or because there has been little archaeological input into the document. Building links with other environmental agencies, both

in terms of personal contacts and the ability to easily exchange information (see below), should be an important aspect of a caves management strategy.

The third point is the need for archaeologists to develop co-operation with cavers. Many initiatives in cave conservation come from the caving groups themselves, who recognise the need to balance access with responsibility. The positive relationship established between EN and fossil collectors on the Jurassic Coast may be one model (see above). Perhaps more pertinent, however, is the way the Nautical Archaeology Society and related groups have engaged with recreational divers to raise awareness of and act to safeguard underwater archaeological sites. There are many analogies between the diving and caving communities:

- they are essentially self-regulating (making legislation hard to implement) so a conservation ethos is best implemented by establishing personal contacts based on mutual respect;
- there is a need to provide basic information, be it through literature (cf. some of the leaflets about underwater archaeology), visits and talks, or more formal training (the maritime archaeologists have found that the diving instructors are the best people to educate, since their expertise will be passed on to their trainees);
- establishing good relationships also implies a need to listen - and provide a proper forum for listening, perhaps through, for example, an on-line form for reporting finds in caves;
- there is a huge resource of interest and expertise which could be properly harnessed in the interests of archaeology - for instance, cavers have basic survey and mapping skills for their own needs and could therefore easily undertake simple tasks of mapping and recording archaeological discoveries (cf. the 'Diving with a Purpose' scheme). Collaborating on an archaeological version of the NCA site inspection report form could be one way forward.

Since cavers will not stop exploratory digging it is important to regulate this within individual CCPs, to educate cavers with a basic understanding of archaeological stratigraphy (so that it is clear that merely collecting finds is not good enough) and to provide clear information on where to turn when discoveries are made. Two recent documents by Martin Roe aimed at those exploring ancient mines may provide a useful model (Roe 2002a; 2002b). In return for cavers' co-operation it is then incumbent upon archaeologists to make the results of their research available and comprehensible to the wider caving community.

Of course there are many cases where cavers and archaeologists have already worked together productively, as at Carsington Pasture Cave, where recording and removal of human remains was carried out by members of the Pegasus Caving Club, assisted by archaeologists from the University of Sheffield (see Chamberlain 1999). Similarly, a number of links with the environmental agencies have been developed on a project-specific basis. In the Creswell Crags area, for instance, there is a strong link between EN and English Heritage through the joint designation of sites as SAMs and SSSIs based on their Quaternary archaeological and geological significance. This assessment will add further momentum to collaborative conservation initiatives such as the Limestone Strategy, which seeks to strengthen the management framework of archaeological, natural historical and geological sites throughout the region through joint working and networking. EH should be actively seeking to expand archaeological input to other initiatives, such as the databases under development by the NCA and BGS, or BCRA's cave heritage centre.

The final point is that there is a great deal of information out there and some overlap in terms of what is useful for archaeologists, cavers, geologists and biologists. It will be far more effective and positive to share that information and make databases both compatible and, as far as possible, accessible to public scrutiny on-line. Ignorance on the part of cavers, developers or other agencies would then no longer be an excuse for destruction or damage to these most precious of sites.

National audit

The information presented above shows the need for EH to implement a national audit of archaeological cave resources as the basis for developing an integrated management strategy. However, a national survey is a big undertaking, especially given the need to include rock-shelters and caves without known archaeology (see below), so a pilot study is essential first. This will also allow various means of conservation management and different survey methods to be trialled, along with the predictive modelling aspect proposed by Donahue *et al*. (2000). The pilot study will then inform the feasibility, timetabling and costing of a national roll-out (including any further work in the pilot study areas). It is proposed that the scope of the pilot study should include the Peak District and Yorkshire Dales National Parks, both of which have many cave sites as well as curatorial archaeologists (Ken Smith and Robert White respectively) concerned with conservation and management issues; the scope of the pilot will also ensure coverage of different geologies. These two areas probably represent at least 50% of the national limestone cave resource (estimates suggest there are some 1500 caves in the YDNP and 260 in the PDNP) so the pilot will need to adopt a sampling approach.

The audit should:

- first assess the state of current knowledge, in order to define criteria for national importance (the first stage of MPP work);
- consider the research potential, vulnerability (i.e. risk assessment) and methodological potential for each site;
- include rock-shelters, cave entrances and talus deposits in order to understand the full extent of each site;
- include artificial caves, such as those in Nottingham (though this is not relevant for the pilot areas);
- identify what is known about each site, including an assessment of unpublished material and records held by speleological groups and museums;
- include a programme of site visits, to survey and assess the condition of deposits at known sites, where this information is not available from the archive; and to assess the potential of uninvestigated caves and rock-shelters.

Archive assessment is not a straightforward process. The initial task will simply be to assess what sort of material is held where, but ultimately some appraisal of the quality and potential of each archive will be required: not only to judge the reliability of published reports but also to consider what further work may be worthwhile and whether this would need to be accompanied by limited additional fieldwork.

The last bullet point also requires further clarification: there should be no intrusive fieldwork or sampling at this stage - we need simple ‘look-see’ information first, including the visual

identification of deposits with archaeological potential, their locations, thickness and texture, etc. as well as their condition; and the identification of threats (including animals, natural erosion, human activity, pollution in run-off from the land) as a basis for proposing conservation/ mitigation measures. Assessing the potential of unexplored sites and landscapes is regarded as important by curators but to visit every cave would be time-consuming and expensive; the site visit element therefore needs to be assessed case-by-case, depending on the quality of the archive (for the known sites) or undertaken as a sampling exercise (for the unknown) in order to characterise the potential of specific landscape areas (however these are defined).

The main outcome of the audit should be a database, which primarily needs to be useful for assessing the conservation and management issues (e.g. locating and mapping sites at an appropriate scale for future management) but also needs to have a public, web-based 'front end' providing easily accessible information for cavers and others. It will therefore be crucial to build the design element for this into the project. The database should also be compatible with or linked to cave databases or registers maintained by other organisations (see above). The design process will also identify the best organisation to curate, maintain and update the database (perhaps the NMR, with its key element of public access).

A secondary product of the project should be a management report addressing the issues outlined above and making recommendations for further work. A useful by-product would be a leaflet or guidance notes for archaeologists, curators and cavers, along the lines of EH's *Managing Lithic Scatters*.

In parallel with the commissioned audit, EH needs to develop and enhance contacts in the interests of cave conservation, both within the organisation and without. Internally, Archaeological Investigations have particular expertise in survey and recording (including map reconciliation). The MPP needs to be consulted regarding class definitions and scheduling issues. The latter include definitions of national importance, defining the extent of sites needing protection, and even whether scheduling of underground caves is appropriate in terms of ensuring adequate monitoring. While scheduling remains just one of several management tools available, to be used where it is helpful, it may have a political value: the greater number of cave SSSIs compared to SAMs may give cavers the erroneous perception that the things EN is interested in are more important.

Outside EH, the NCA, EN and the BGS are key partnership organisations with whom good working relationships will enhance both knowledge of the resource and understanding of the issues, while for particular localities organisations like the National Parks and the NT are important contacts. An assessment of the management options adopted by various organisations will help inform archaeological strategies, while data from monitoring sites over a period of time will be available in some cases (e.g. the White Peak) to help give a sense of the timescale of changes to cave environments and deposits. The launch of the pilot will provide an early opportunity for a broad-based seminar for academics, cavers and conservationists to publicise the project and discuss some of the wider issues regarding cave research and management.

During the implementation of the pilot study, it will also be necessary to explore possible sources of partnership funding for later stages of the project, be that the national roll-out of the audit or possible follow-ups involving more detailed archive assessments, sampling of deposits or other fieldwork.

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