



ENGLAND'S

**ROCK art**

**The Prehistoric Rock Art of England:**  
Recording, managing and enjoying our carved heritage

# *Introduction*

Across northern England the remains of thousands of enigmatic symbols can be found carved onto rocky outcrops and boulders. They range from simple circular hollows (known as 'cups') to complex combinations of cups, rings, grooves, spirals, lozenges, and chevrons. Some occupy spectacular locations in the landscape, whilst others are found on prehistoric stone monuments or in burial mounds. These curious abstract designs were created by the Neolithic and Bronze Age people who lived in these lands over four thousand years ago. No-one knows their original purpose and they are one of the most intriguing elements of the archaeological landscape.

Over the last few centuries the discovery and recording of rock art in Britain has been pioneered by a handful of dedicated antiquarians and specialist amateur archaeologists. Increasing interest has led to a huge increase in the quantity of carved stones recorded in recent years, and has drawn the attention of professional archaeologists and academics. At the same time, new recording technologies such as photogrammetry and laser scanning, together with more established techniques such as excavation and surveying, are revealing new information and helping to shed fresh light on when and how rock art was used.

Although carved in stone, the rock art which survives in today's landscape is very vulnerable. The condition of many rock art panels is deteriorating due to both human and natural threats. The creation of an accurate record of all rock art is fundamental to researching, protecting

and managing this fading link with our prehistoric past. The England's Rock Art (ERA) website and database:<http://archaeologydataservice.ac.uk/era> provide an important step towards this goal; starting with the pilot areas of Northumberland and Durham, the intention is that it will eventually include a record of all rock art in England. The information for the pilot project was gathered by trained volunteers over a three year period, as part of the Northumberland and Durham Rock Art Project sponsored by English Heritage and run by Northumberland and Durham County Councils. The project built on and incorporated the work of the Newcastle University Beckensall Archive. As the geographical coverage of the database is extended across the country, using the best practices developed during the pilot project, the information collected will be used to inform management decisions which balance access and education with conservation and protection of this fragile resource.

This publication provides an overview of rock art in England, setting it in its wider British and European context, and illustrates some of the challenges of recording and protecting this unique connection with our prehistoric ancestors. Please remember: almost all our rock art is situated in the countryside and is privately owned. If you visit it, please treat it with respect; the responsibility for preserving these ancient carvings rests with each one of us. Please respect property and always ensure you have permission to access private land.



Dod Law, Northumberland. Photographed by T. Barnett.

# What is Rock Art?

The term 'rock art' is used to describe prehistoric carvings which have in some way been cut into the surface of a rock. It is found all around the world and in many places the designs include human figures, animals, and objects such as weapons, boats or houses. England (and the rest of Britain and Ireland) is unique in that, unlike elsewhere in Europe, the overwhelming majority of art from the Neolithic and Bronze Age periods is entirely abstract. The most common motif across all rock art, worldwide, is the simple cup-mark.

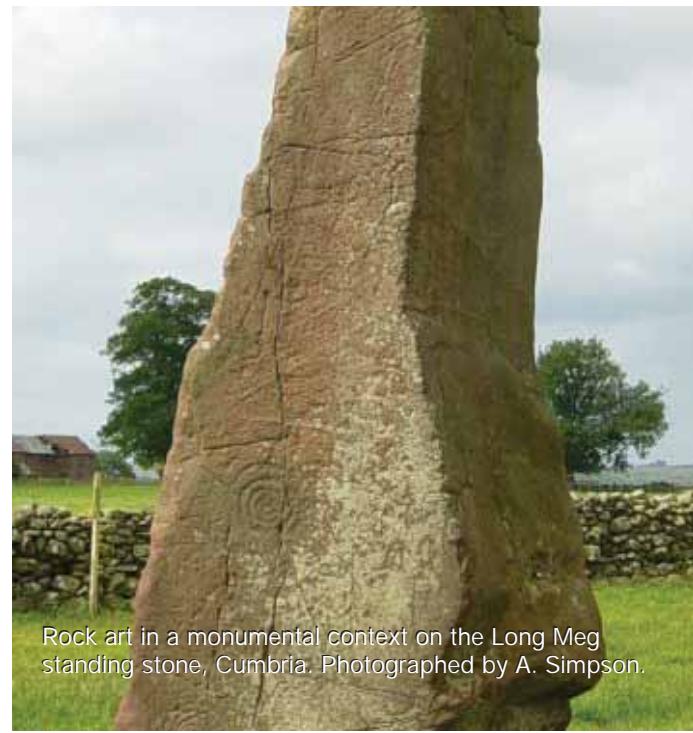
Prehistoric rock art occurs in England in three main situations. The majority is found on outcrops and earth-fast boulders and is described as 'landscape' or 'open-air' rock art. A second group, known as 'megalithic art', is associated with monumental structures

ranging from Neolithic stone circles to Bronze Age burial cists. The remainder are smaller stones which may have no prehistoric context, and which have sometimes been re-used in modern structures. These are known as 'portable' or 'mobiliary' art. Some carved stones may have been re-used several times, perhaps beginning life on an outcropping rock before being quarried for use in a stone circle or cairn, and finally being used as building material.

Around 2500 carved surfaces or 'panels' have been recorded in England; new ones are identified every year and further examples almost certainly await discovery. Many more examples are known in Scotland, Ireland and Wales, and it is in this context – of the whole of Britain and Ireland – that English rock art is best understood.



Rock art in the landscape. Cup-marked boulder on Fylingdales Moor, North Yorkshire. Photographed by B. Kerr.



Rock art in a monumental context on the Long Meg standing stone, Cumbria. Photographed by A. Simpson.



Group of portable cup-marked cobbles belonging to the Society of Antiquaries of Newcastle upon Tyne. Photographed by NADRAP Team 2b.



Cup and ring motifs at Tod Crag 1a, Northumberland.  
Photographed by NADRAP Team 3.



Unusual motif at The Ringses, Northumberland.  
Photographed by A. Mazel.

## Distribution & geology

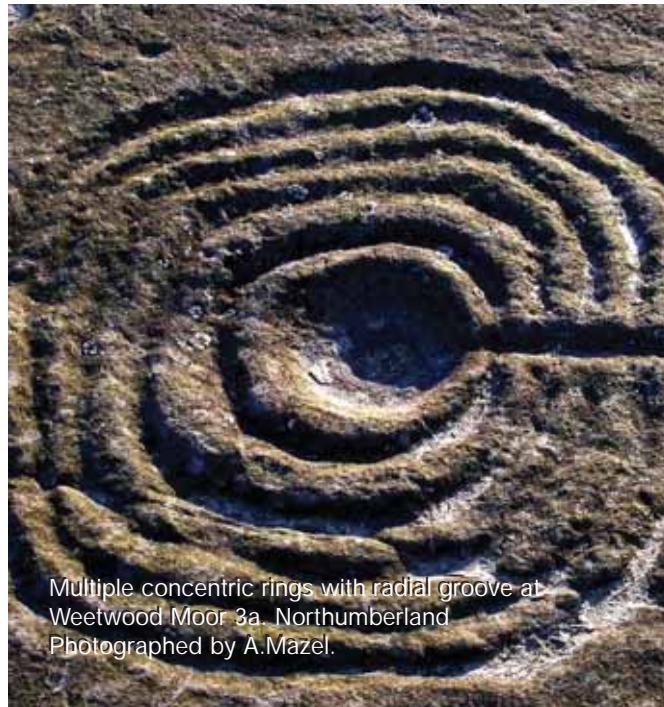
Most British rock art occurs in the north, across an area between West Yorkshire and the Caledonian Canal in Scotland. Carved stones tend to be found in clusters with major concentrations in Scotland along the coast of Dumfries and Galloway, in Argyll and Bute, and Perthshire and Kinross; in England in north Northumberland, on Barningham Moor and Gayle's Moor on the North Yorkshire/Durham border, on Rombald's Moor in West Yorkshire, and on Fylingdales Moor on the east coast of North Yorkshire. Other groups are found in Cumbria, Derbyshire, Wales, Anglesey, the Isle of Man, and the Highland region of Scotland. In Ireland rock art is located in the Iveragh

Peninsula and in Co. Donegal. Passage tomb art (see opposite) has a less extensive distribution, being concentrated around the Boyne Valley in Ireland, the west coast of Argyll and Bute, and the islands of Anglesey and Orkney.

This northern distribution may be partly related to the underlying geology. Most rock art in England is found on sedimentary rocks – the Millstone Grits of Yorkshire and the Fell Sandstone of Northumberland. In Cumbria, however, and elsewhere in western Britain, carvings are also found on igneous and metamorphic rocks such as granites and schists.



Simple cup marks on boulder at Wandylaw G, Northumberland.  
Photographed by NADRAP Team 1.



Multiple concentric rings with radial groove at Weetwood Moor 3a, Northumberland  
Photographed by A. Mazel.



Interlocking cups, rings and grooves at West Horton 2a, Northumberland  
Photographed by A. Mazel.

## Motifs and 'Styles'

By far the most common design element is the simple cup-mark – a roughly circular hollow, usually between 3 and 10 cm in diameter and around 2-3 cm deep. Also common in Britain are ‘rings’ and ‘grooves’. These can occur individually or can be combined to form more complex motifs such as the ‘cup-and-ring’ or ‘multiple, concentric rings’. Other, less common motifs include penannulars (incomplete rings), spirals, ‘keyholes’, and ‘rosettes’. These can be combined in a variety of ways and each panel appears to be unique, although two broad ‘traditions’ of rock art have been identified in Britain:

- ‘passage tomb’ art is associated with chambered tombs, particularly those of the Boyne Valley in Ireland, and also in Scotland and Anglesey; few examples are known in England. It is typified by angular elements including chevrons, triangles and lozenges, which cover the entire available surface, and are arranged in regular, geometrical and symmetrical patterns.
- ‘cup-and-ring’ art is more prevalent, being found across northern Britain. It uses mostly curvilinear motifs, including simple cups, grooves, rings, and variations of these. These carvings are found in a much greater variety of locations, including on outcrops, boulders, cliffs and rock

shelters, but are also associated with cairns, stone circles, and standing stones. Most are found on horizontal or gently sloping surfaces, and natural features such as fissures may be incorporated into the design. They are ‘fluid’ in their design and they tend to be found in open, ‘public’ positions.

Most carvings were created by striking the rock surface using a stone tool. ‘Peck’ marks remain visible on panels which have been protected from the elements, varying in size from less than 1 mm up to 4 mm in diameter, and perhaps indicating that a variety of tools was used. Possible examples of ‘hammerstones’ or ‘peckers’ have been found at rock art excavation sites (Dod Law and Hunterheugh in Northumberland, and Torblharan in Kilmartin, Argyll and Bute). It is likely that designs were mapped out before being pecked. In some examples long grooves appear to have been made by pecking a series of small cups in a line and joining them together. There is no evidence that the motifs were coloured although several small fragments of red ochre were found during excavations at the Hunterheugh rock art site in Northumberland. Even without added colour, the contrast made by the removal of flakes from the weathered surface of the parent rock would have produced a striking effect.



Angular motifs in the ‘passage tomb’ style, found on Fylingdales Moor, North Yorkshire. Photographed by G. Lee.

# *Understanding Rock Art*

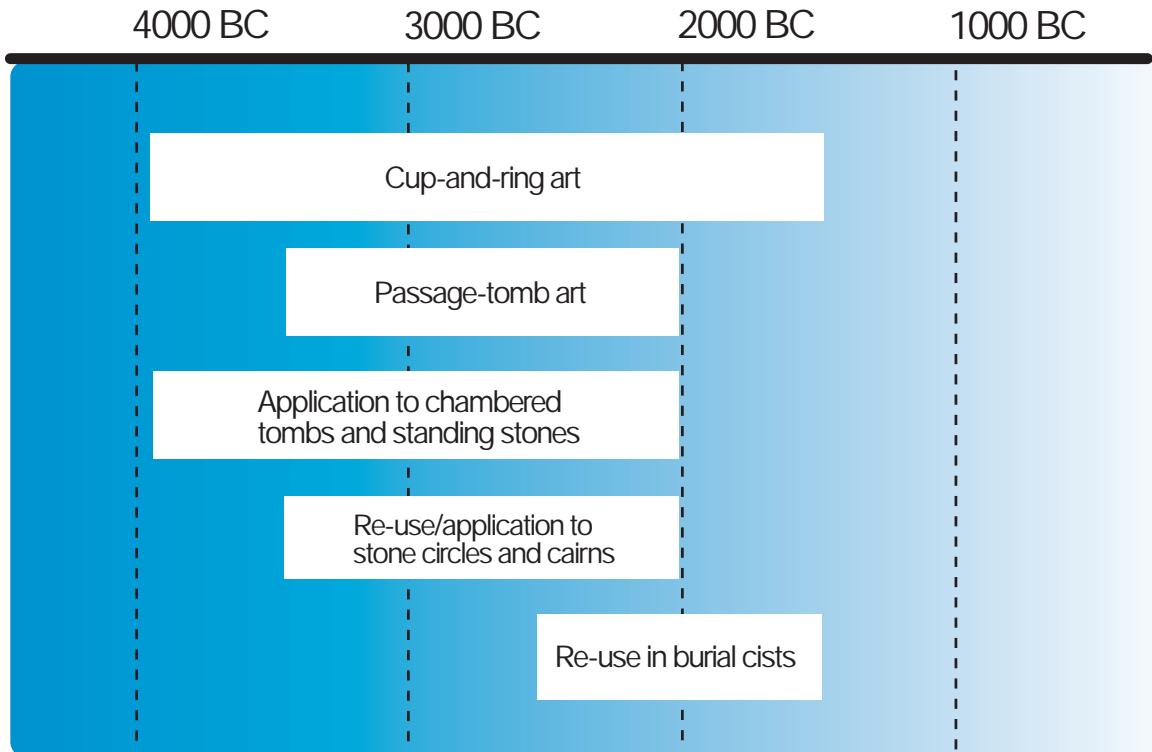
The meaning of rock art has become lost in the mists of time; no mention of it appears in the historical record until the late 17th century when reference is first made to marks found on stones from the Newgrange passage tomb in Ireland. In England it was not until the 1820s that the 'cup-and-ring' style of rock art was first noted at Old Bewick Hill in Northumberland by John Charles Langlands and reported by the local antiquarian, George Tate. Many theories have since been put forward to account for the carvings but no-one has yet been able to unlock their secrets. However, researchers are now extending the study of rock art to include the surrounding topography, the soil beneath, and the wider archaeological landscape. This approach is allowing us to explore questions such as the date of the carvings, whether different motif types reflect particular activities associated with the use of a site, and whether there are regional traditions.

## **How old is it?**

Dating rock art precisely is extremely difficult; the abstract nature of the designs provides few clues and they are rarely found with other types of dateable evidence (although this partly reflects the small number of excavations which have been undertaken at rock art sites). It has been argued that the 'cup-and-ring' tradition is a Bronze Age phenomenon, but researchers now believe that it is rooted firmly in the Neolithic (about 4000 to 6000 years ago). Simple cup-marks are known from undisputed earlier Neolithic contexts in Britain, for example in long cairns such as Dalladies in Aberdeenshire, dated to 3280 BC. Cup-marks and more complex motifs also occur in Neolithic and Bronze Age monuments and in some instances this may represent a re-use of stones which have been removed from their original context. A few examples of superimposition (where one motif overlies an earlier one) have been identified but

these can only tell us about the relative age of each motif. Another way to determine the relative age of carvings is to look at the degree of weathering visible (see Case Study 1). Comparisons with other types of decorated artifacts from other sites may provide further clues to the approximate age of rock art. The Late Neolithic Folkton Drums from East Yorkshire are elaborately carved with geometrical patterns and designs resembling stylized human faces. Linear and hatched patterns have also been found on pieces of chalk in various contexts, several dated to the Neolithic. These have been compared to the 'passage tomb' style of carvings and with the decoration on some types of Neolithic pottery. Many of these decorated objects can be considered 'special' items, often found in what are considered to be ritual contexts. This may imply that the designs are related by more than simply a period in time or by geographical distribution.

The relationship between the 'passage tomb' and 'cup-and-ring' traditions is unclear. There is a large degree of overlap, with 'passage tomb' motifs occurring in other monuments, such as stone circles, and also in the landscape as at Achnabrek in Argyll, Scotland, and at Morwick in Northumberland. Conversely, simple cups and 'cup-and-ring' motifs are often found alongside the geometric designs of passage tombs. In general, the 'cup-and-ring' tradition in Britain appears to fall within the period between 4000 and 1500 BC, with 'passage tomb' art occurring between 3500 and 2000 BC. However it is unlikely that British rock art was a uniform phenomenon, and the various practices probably had different life-spans in different regions, with some motifs being more widespread or more persistent than others.



The approximate chronology of British rock art.

### Excavating rock art

Archaeological investigations around rock art panels in Scandinavia, Ireland, Scotland and England are challenging previously held views of how rock art was used. These investigations have demonstrated considerable activity associated with some carved rocks and around clusters of rock art panels. Excavations have uncovered pavements of mud and cobbles abutting carved panels, with huge quantities of stone tools scattered over them. These features were associated with pits containing burnt animal bone and other charred remains, and stone tools and waste material were deliberately jammed into natural fissures in the carved rock. The chronological relationship between these features and the carvings remains uncertain, but the data strongly suggest that rock art played a part in activities that may have involved fire, feasting and offerings.

### Connections

One approach to understanding British rock art has been to study similarities in style between the rock art traditions of Britain and Ireland and those of continental Europe. Some believe the tradition may have originated in Portugal and Spain and that the coastal distribution of rock art may reflect northwards maritime travel in the currents of the Gulf Stream, with northern connections to Scandinavia. But this would not account for inland clusters, such as those of West Yorkshire or the Derbyshire Peak District; nor would it explain the relative absence of rock art on the Cumbrian coast. So did British rock art develop in isolation, was it stimulated by diffusion of ideas or was it brought more directly by colonising communities? There is little evidence to suggest where such ideas or people may have originated. The ubiquitous cup-mark appears to have developed in diverse and dispersed cultures across the world lending weight to arguments that these simple designs (and the urge to create them) are somehow hard-wired into the human psyche.

# Case study 1: Hunterheugh

The excavation at Hunterheugh Crag, Northumberland, in 2004 was designed to investigate a remote site where a small stone cairn overlay a carved rock outcrop. It was hoped that if the cairn could be dated it would provide a date by which the rock art must have been in existence. The investigations however, exposed a more complex story than anticipated.

The site is positioned on a Fell Sandstone scarp edge of around 2.5 m in height, which runs along the north side of the valley of the Tittlington Burn. The rock rises gently to a localised high point and it is on this low dome that the carvings are located. Prior to excavation much of the outcrop was covered by turf, appearing as a few insignificant small flat slabs amongst thick tufts of heather and bracken. The vegetation was removed from an area of around 14m<sup>2</sup> around the Hunterheugh 1 rock carvings, and the rock surface was cleared. The site took on an altogether different appearance. Away from the escarpment edge the rock dome shelfed off fairly steeply giving it an almost monumental form due to its more pronounced profile. This raised dome appeared to form a discrete entity slightly apart from, and more upstanding than, the rest of the rock outcrop. The character and extent of the carved rock after exposure was completely different from its previous, modern day appearance, and this has serious implications for how other carved outcrops are interpreted in future.

Beneath the heather two dozen new motifs were discovered including cups, cup-and-rings and grooves. However, it was also evident that the rock surface had been heavily quarried and it was on the quarried surface that all the fresh and apparently more deeply pecked motifs were located; in one case the quarrying had cut through clusters of pre-existing and very heavily weathered motifs. The cairn overlay

part of the quarried area and had subsequently been incorporated into a later prehistoric field boundary. All these elements demonstrated a lengthy sequence with an episode of quarrying separating two different phases of carving, the latest of which was overlaid by an Early Bronze Age cairn. The earliest rock art motifs, carved prior to the quarrying, were significantly more weathered than those of the later phase, some of which were applied to the freshly quarried surface. However, the fact that some of these later carvings were themselves badly weathered suggests that a substantial period elapsed before they were protected by the building of the cairn. This provides a relative date for both phases of carving, and appears to demonstrate a possible Neolithic origin for the carvings. The subtle variations in depth, style and position of the motifs can clearly provide valuable clues to the history of the site, demonstrating the importance of detailed and accurate recordings.

Small finds from around the site included a range of Neolithic–Early Bronze Age stone tools including a ‘tortoise’ shaped sandstone cobble with a single flat side that appears to have been smoothed into shape, possibly a rock art tool. Also found were three small pieces of red ochre. The cairn material yielded five examples of portable rock art – small quarried stones or boulders with a variety of markings.

## Read more about the excavation in:

Waddington, C. 2004. Rock of Ages

*British Archaeology* 78: 16-21.

Waddington, C., B. Johnson & A. Mazel. 2005.

Excavation of a rock art site at Hunterheugh Crag,

Northumberland. *Archaeologia Aeliana* 34 (5th Series): 29-54.



Detail of motif at Hunterheugh showing freshly exposed peck marks. Photographed by A. Mazel



Archaeologists excavating rock art at Hunterheugh. Photographed by A. Mazel.



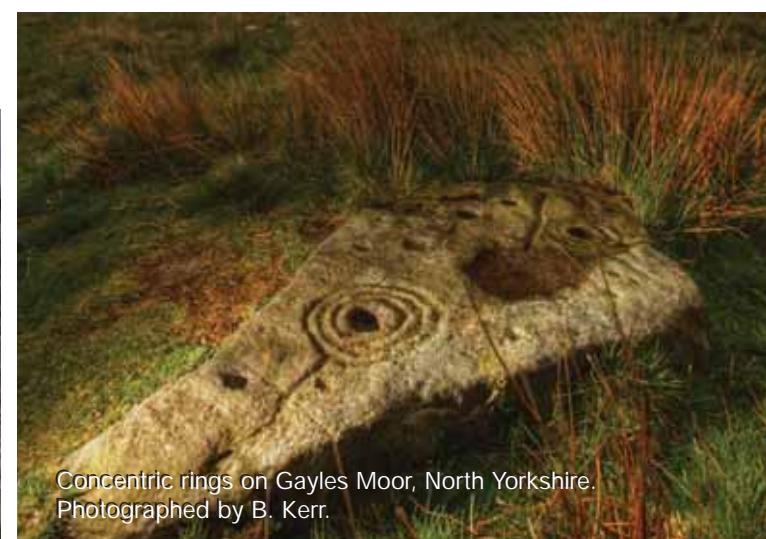
Deep cups on a boulder on Gayles Moor, North Yorkshire.  
Photographed by B. Kerr.



Millstone Burn 2h, Northumberland.  
Photographed by NADRAP Team 2.



Weathered rings at Chatton, Northumberland.  
Photographed by B. Kerr.



Concentric rings on Gayles Moor, North Yorkshire.  
Photographed by B. Kerr.

## The meaning of rock art

The interpretation of prehistoric art as ‘information’ is problematic; most researchers acknowledge the impenetrable nature of the ‘meaning’ within British rock art. The societies which created the carvings used systems of communication and symbolism very different from our own; our language is unable to capture the hints, metaphors and nuances that may be embedded in the carvings. Yet both the restricted repertoire of symbols and their repeated use across the landscape suggest a shared vocabulary, which in turn implies that the symbols or their various combinations had very definite meanings for the people who created it.

The situation is further complicated by regional variations with clusters showing differences in the motifs used, the form of ‘canvas’ chosen and where rock art was placed in the landscape. In Scotland, spirals are more common in the east than the west, and in some regions only cup-marks are found. In Galloway, rock art has a coastal distribution and is found at low altitudes close to sea level, whereas in West Yorkshire (and other inland clusters) it is found on elevated moors, but always below the highest ground.

In some areas complex designs are found on outcrops whereas cup-marks are restricted to boulders; elsewhere complex designs appear to be restricted to higher elevations and cup-marks are found lower down the valleys.

All these variations suggest that the positioning and choice of motifs may mean different things in different areas. The emerging picture is complex with many subtle differences both within and between regions. Factors such as geology, survival, and the incomplete nature of the record add further layers of uncertainty. Despite all these problems, a few archaeologists have started to develop theories or suggestions which may help to untangle some of the meaning of rock art; you can read about some of these ideas on the next page. The fact that the practice of carving rocks flourished for such a lengthy period suggests the symbols had enduring significance; their power and meaning undoubtedly evolved for the people who lived amongst them, and who developed from a nomadic community to the sedentary, segmented and hierarchical society who eventually lost the need to use them.



View over cup-marked outcrop at Crummock Water, Cumbria. Could this mark a route along the valley?  
Photographed by K. Sharpe.

## *The search for meaning*

Most carvings in England are found on outcrops and boulders. These decorated stones appear to have little archaeological context, yet the act of carving represents a permanent expression of a connection with the landscape – an indication that ‘space’ has become ‘place’. Archaeologists believe that the types of stone chosen and their position in the landscape can provide clues to the role of rock art in the prehistoric world.

### **Defining territory?**

Rock art is often found on, or close to, striking natural features such as ‘monumental’ outcrops, unusual boulder formations, plunging waterfalls, caves, rivers and cliffs. These dramatic locations evoke emotional and imaginative responses and may have formed an important part of the mythical landscape of the past. Connections to specific places can also be created through shared social events, natural catastrophes, or more personal experiences. Could rock art have been used to record permanently the attachment felt by groups to special places in ‘their’ land?

### **Route-markers?**

In some areas the deliberate positioning of carvings on relatively high ground, often with extensive views, and along possible ‘route-ways’, seems to point to a connection with movement across the land. Decorated stones are often found overlooking natural harbours, at the entrances to possible routes

inland, close to mountain passes, and along the edges of valleys. At Millstone Burn in Northumberland carved stones command significant views in two directions along the valley axis; in the Kilmartin Valley in Argyll and Bute, carved panels lie along the edges of valleys between coastal sites and Loch Awe to the north. However, associations with specific routes are problematic since few actual prehistoric tracks have been identified. Further, an understanding of both route-ways and the extent of views requires a more detailed understanding of the nature of prehistoric vegetation than is currently available.

### **Sacred spaces?**

Rock art is often found in locations which may suggest a strong ‘spiritual’ element to the role of the carvings. In hunter-gatherer communities, ‘liminal’ locations – where dark meets light, where mountains touch the sky, or the sea reaches the shore, are often considered the domain of supernatural beings or ancestors. The occurrence of carvings in these places suggests a religious significance to the motifs, perhaps used to mark the focus of links between past and present, the living and the dead, or between real and spiritual worlds. Such ideologies may account for the complex array of motifs on the red sandstone cliffs above the River Coquet at Morwick in Northumberland, or the extensively decorated outcrop situated close

to a waterfall at Roughting Linn, also in Northumberland. Relationships are also suggested between the carved Bokeh Stone and the mountain of Croagh Patrick (later regarded as sacred) in Northern Ireland, and between the carved boulders at Copt Howe in Cumbria and the nearby Langdale Pikes.

The presence of rock art within ceremonial and burial monuments also suggests connections with ritual activity, although these associations tend to occur later in the Neolithic and into the Bronze Age and may reflect a change in the significance of rock art.

### Natural influences

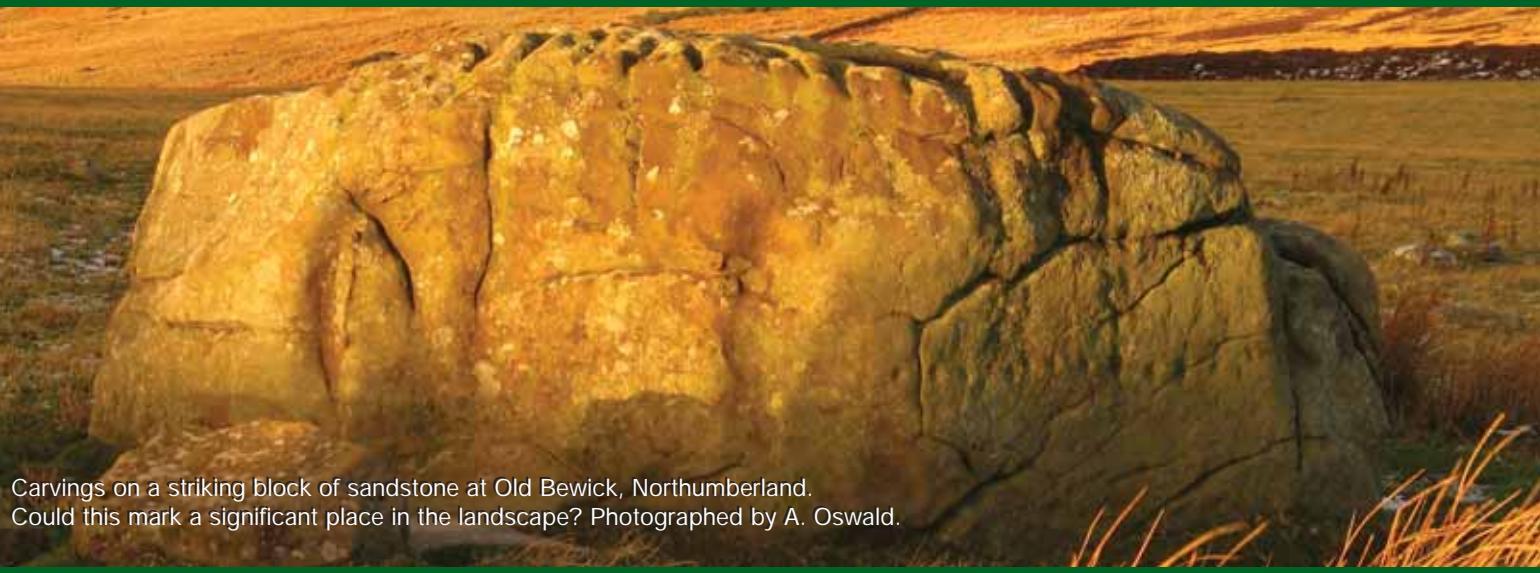
One recent strand of research which could provide new insights into the way carvings were originally perceived has studied how the motifs relate to the shape and fabric of the rock on which they are carved. Observations suggest the motif-makers looked closely at the rock surface to see what motifs would fit onto it, taking into account features such as cracks, indentations and other irregularities. Indeed, relationships have been identified between the size and nature of the motifs, and the size and shape of 'frames' formed by natural fissures on the rock surface.

It has been suggested that natural features, such

as hollows and cracks, may have been regarded as ancestral images to be incorporated, mimicked, or even erased by the application of new motifs, with both natural and artificial markings attracting the addition of new images. Natural features on the rock and their relationship to the motifs may form an important part of our understanding of the carvings themselves.

### Public versus private?

The public nature of rock art in the landscape suggests that it was intended for a wide audience, although carvings may have been viewed by different groups of people at different times. Complex panels, often found at the outer edges of the settled landscape, may have been visited only occasionally during hunting expeditions or seasonal grazing. The groups using these panels would therefore have needed precise information. By contrast, simple carvings in the lower, settled areas would have served a more stable population who shared the same body of knowledge. But simple relationships between 'style' and social structure do not always hold and it is also argued that the simpler the art, the greater the range of meanings that can potentially be drawn from it.



Carvings on a striking block of sandstone at Old Bewick, Northumberland. Could this mark a significant place in the landscape? Photographed by A. Oswald.



Unusual rectangular motif at Dodd Law, Northumberland: specific information intended for a particular group of people? Photographed by B. Kerr.



Natural channels at Chatton, Northumberland; part of the design? Photographed by NADRAP Team 3.

# Valuing rock art today

Today rock art is an important element of the cultural landscape of northern England. Dedicated internet forums and websites have made rock art widely accessible both intellectually and physically. This has inevitably led to an increase in visitor numbers to fragile rock art sites already at risk from natural threats. Strategies for recording, conservation and management are required in order to ensure that rock art survives to be studied and enjoyed by future generations.

## English Heritage and the England's Rock Art Website

Since 1999, English Heritage has been developing a strategy for the management and understanding of rock art in England. A review of rock art studies was commissioned from Bournemouth University and University College London, and the resulting report set out six proposals for improving the current state of British rock art. These formed the basis for English Heritage's *Rock Art Management, Access, Study & Education Strategy* (RAMASES), which provided a framework for directing future work on rock art. The first of these proposals recommended the development of a national

database of all known rock carvings in England. The Northumberland and Durham Rock Art Project (NADRAP) was developed by Northumberland and Durham County Councils at the request of English Heritage as a pilot for the creation of a standardised recording strategy and rock art archive that would be publicly accessible through the Internet. Over sixty local volunteers were recruited and a recording 'package' was developed over a three year period.

This methodology is now being rolled out nationally to enable standardised baseline data to be gathered in all regions of the country and added to the database. You can search the website and find out more about the project at: <http://archaeologydataservice.ac.uk/era>

Some of the key components of the NADRAP methodology and their applicability are discussed here, but since our understanding and technological capability are evolving rapidly, these represent only a basic framework for recording and a benchmark for future development.



Carved cobble built into stonework at Paine's Bridge, Wallington, Northumberland. Photographed by A. Mazel.



Gled Law 3, Northumberland. Photographed by B.Kerr.

# Recording Rock Art

The creation of a reliable and accurate record is an essential part of researching, protecting and managing rock art. A wide range of recording approaches have been developed over time by different individuals and organizations in this country and around the world, all of which have relative merits and limitations. British rock art is a fragile resource and repeated contact with it contributes to its decay. Some recording techniques are harmful and inappropriate. The most important guideline for rock art documentation is that it should be non-destructive. It should also aim to:

- provide a lasting record of rock art that may become damaged or destroyed;
- be as comprehensive and objective as possible; and
- provide a consistent, standardised record to allow for comparative assessment and monitoring.

## WHAT should we record?

Traditionally, documentation of rock art has focused on the individual motifs and the designs they form on the rock surface. In recent years, however, there has also been a growing interest in the context in which rock art is found. It is now recognized that rock art recording should include the rock surface itself, its wider situation, and its condition.

The surface record should include natural features such as fissures, which may be an integral part of the overall design, and may add significance to the rock art. Other aspects of the rock itself may also be important, including its shape, colour and texture, its orientation, and the pattern of any water flow over its surface.

The record also needs to consider the wider context of each panel. In many rock art locations, the prehistoric context has been substantially altered through time. Stone is an important resource and, through human interference, has become a dynamic aspect of the landscape. Whether deliberately or not, carved stones have been incorporated into burial monuments, standing stones, field clearance cairns, field boundaries, stone walls, superstructures of hill forts, buildings, millstones and even milestones.

Exploring and documenting the physical and cultural contexts of rock art can help us understand how its significance and value have changed through time.

The recording of benchmark data on the condition of carvings is also essential in order to monitor decay, and explore the causes and rate of surface loss. Condition recording also enables us to identify those carvings most at risk, and alerts us to where conservation and management resources should best be deployed.

## HOW should we record rock art?

Since British rock art is non-representational and its meaning is obscure, our records will inevitably be subjective. Recording techniques must therefore aim to reduce or eliminate subjective interpretation by the recorder, however experienced, in order to capture a faithful representation.

The methods used to record rock art are shaped by the nature of the rock art (including the nature of the panel and its location), its vulnerability, and how the record will be used. The information recorded should aim to satisfy questions that may be asked of it by a range of users. Those responsible for caring for rock art need a precise, detailed and measurable record of the rock art, its condition and its surroundings; researchers want a wide range of information on the content and context of the rock art; interested members of the general public want a clear and accurate record of where the rock art is and what it looks like; and a wider audience, including school children, want a visually exciting and engaging record that stimulates their imagination and learning.

## Contact recording

Visual recording can be described as either contact or non-contact. Contact methods such as wax rubbing, tracing, and the creation of replica moulds have traditionally been used to capture a visual record of carvings. All these methods impact on the rock surface and are **not normally recommended**. Contact methods also require varying degrees of interpretation by the recorder and are therefore liable to be subjective. The removal of moss, turf and lichens and 'cleaning' the rock surface before recording can have a substantial impact, especially where chemical cleaners-*Continued on p16*



NADRAP Volunteers capture carvings using drawing, photography and recording forms.  
Photographed by T. Barnett and the NADRAP Volunteers



View over multiple rings at Weetwood Moor, Northumberland. Photographed by B. Kerr.



# Recording Rock Art

*cont. from pg 12*

and hard implements or repeated scrubbing actions are used. Removal of organisms such as lichens can destabilise the rock surface and accelerate deterioration. Repeated cleaning and exposure of carved surfaces can be highly damaging and should not be undertaken without professional advice.

## Recording Rock Art: The Northumberland and Durham Rock Art Project Methodology

The recording methodology developed by the NADRAP volunteers uses a combination of visual techniques, site survey and mapping, and textual recording. The recommended techniques are outlined below. Further details are available from the ERA website <http://archaeologydataservice/era>

### 1) Preliminary survey

A walkover survey of each site and surrounding area was undertaken to establish the physical and cultural setting of the carvings and to identify all rock art panels in the vicinity. For sites with more than one rock art panel, an overview sketch was made detailing the spatial relationship between rock art panels, topography and archaeological features. This was supported by annotated digital photographs.

### 2) Textual recording

A standardised recording form was completed. This included a written description of the rock art and context.

### 3) Photography

Photography is an essential part of recording. A range of images was taken, capturing the carvings and their surroundings. This is an inexpensive and non-specialist technique available to anyone. With the tips suggested opposite you could begin capturing rock art right away!

### 4) Photogrammetry

This technique, typically using stereo-pairs of photographs, provides a means for accurate measurement of archaeological features and artifacts through 3D documentation and visualization. Whilst this is a more demanding technique, inexpensive solutions are now available, utilising both consumer-grade digital cameras and specialist software to process the stereo-images, which are relatively easily picked up after some initial training. You can find out more on page 18.

### 5) Measured sketches

Scaled sketch drawings were made, incorporating key measurements. These showed the patterns of the motifs on the rock surface and their relationship to the natural features using standardised conventions.

### 6) Georeferencing

The location of each panel was determined using a hand-held Global Positioning System device to produce a 12-figure grid reference.

### 7) Specialist recording

In some instances, baseline recording was supplemented by detailed, specialist investigation of selected panels considered at risk or in need of more stringent management. Laser scanning was used to record and monitor some high risk panels. This is a relatively expensive method which captures images at resolutions of less than 1 mm. Other approaches used included detailed archaeological survey of the surrounding area and detailed geological assessment (for evaluating the rate and nature of decay processes). Specialists were also consulted regarding the removal of vegetation such as lichens.

# Tips for Photography

The NADRAP volunteers built up a great deal of experience in capturing good photographs of rock art. Their recommendations are as follows:

- Try to photograph the carvings in low (morning or evening) sunlight, without the automated flash. The oblique light will throw deep shadows across carvings that are almost invisible at mid-day.
- The effect of oblique lighting is even more apparent when the carvings are wet. An ideal scenario would be low sunshine following a shower.
- Sunlight can also cause problems by casting partial shadows (e.g. of tree canopy) onto the carvings. A reflective material such as a space blanket can be used to increase the light on the carvings, or a shade cloth (or umbrella) can be used to block unwanted light.
- For carvings on vertical or near-vertical surfaces, try to work out in advance when they will be in sunlight.

• Where there is little natural light (e.g. in woodland) a strong torch can be used to provide artificial oblique lighting to good effect.

• If you fancy a 'night hike', photography using an artificial light source and a long exposure time on the camera (mounted on a tri-pod) can produce excellent results.

## For good records:

- Use a scale\*, or an object of known size (e.g. a ruler, or compass) so that you will remember the size of the carvings.
- Keep a note of your photographs as it is very easy to forget which panel is which once you get home.
- Take 'context' shots as well as just focussing on the carvings. Pictures of the surrounding landscape (with the carved stone in the foreground) will provide a more complete record and help you remember which stone you saw where.

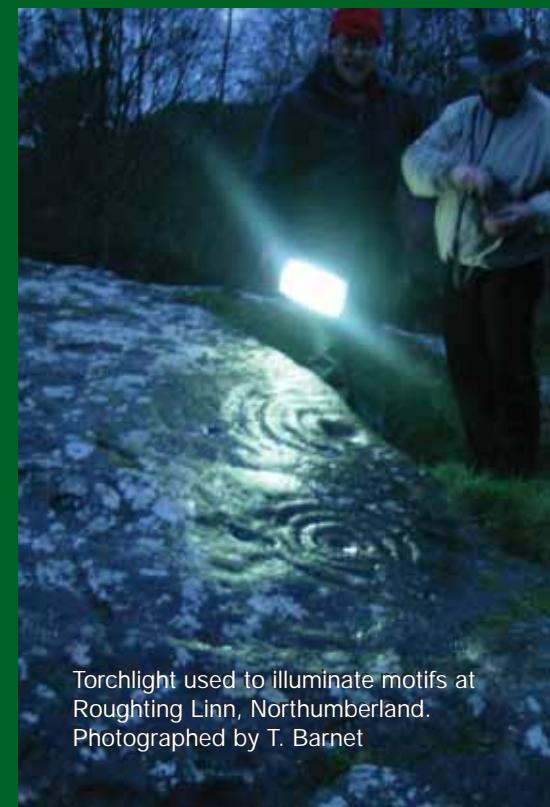
\*Standard colour scales can be obtained from the International Federation of Rock Art Organisations (IFRAO). Website: <http://mc2.vicnet.net.au/home/record/web/scale.html>



Rain and sun help to show cups and rings on Barnburgh Moor, Durham.  
Photographed by R. Stroud



Low sunlight illuminates cups on Ilkley Moor, West Yorkshire.  
Photographed by K. Sharpe



Torchlight used to illuminate motifs at Roughting Linn, Northumberland.  
Photographed by T. Barnet

# What is Photogrammetry?

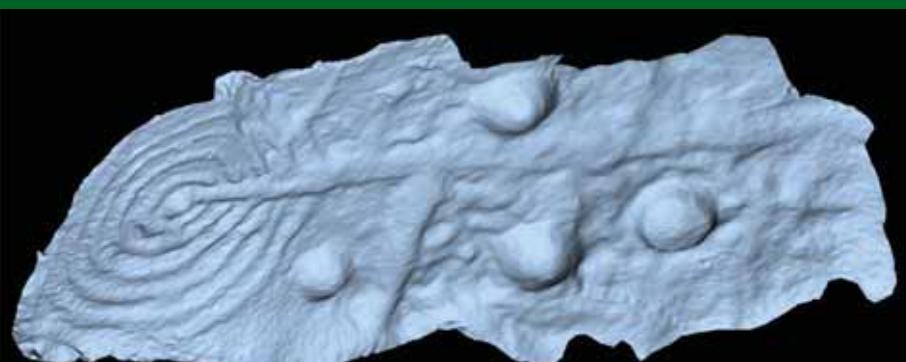
Photogrammetry provides a means for accurate measurement of archaeological features and artifacts through 3D recording and visualization. The technique is based on the principal of stereo-photography where two images of the same subject are taken from slightly different positions. The different perspective apparent in each pair of images (stereo-pair) allows a 3D representation of the object or site to be recorded. Processing this information through computer software enables a wide range of visual data to be created including line drawings, contour plots, and 3D surface models.

A low-cost, non-intrusive method, developed for the NADRAP project by English Heritage in partnership with Loughborough University, was tested and enhanced by the project volunteers. This method, which was primarily based on research work previously undertaken on Australian rock art, enabled the volunteers to capture their own stereo-photographs using 'off-the-shelf' 5 megapixel resolution digital cameras. Volunteers were then able to process these images using 'lower-cost' photogrammetry software (Topcon PI-3000) to produce a range of 3D images and surface models, with an accuracy of up to 1-3 mm. These models can be manipulated on screen and presented in different ways, enabling specific aspects of the rock art to be enhanced and studied.

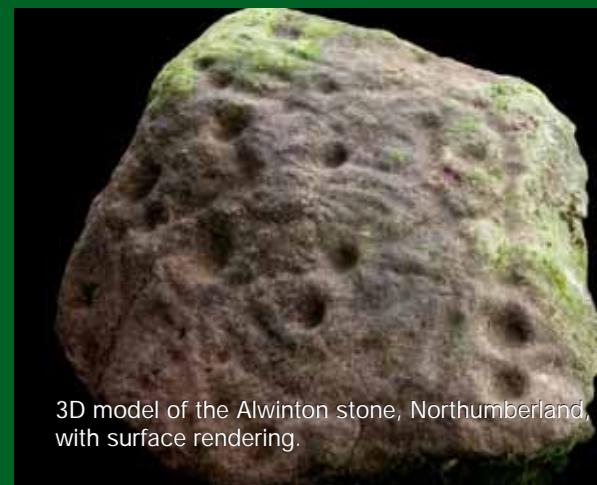
Read more about the photogrammetry in: Chandler, J.H., P. Bryan, & J.G. Fryer, 2007. The development and application of a simple methodology for recording rock art using consumer-grade digital cameras. *The Photogrammetric Record*. 22(117): 10-21.

These include stripping off the surface texture to expose the geological and man-made features more clearly, presenting the image as a contour model to accentuate the topography of the rock, and taking profiles through any plane of the rock to produce cross-sections of the carvings and rock surface.

The benefit of a 3D image is that it provides a more accurate and realistic model of the artifact or monument than conventional 2D recording techniques. The surface texture and topography of the rock, the relative depth of the carvings and the relationship between the carvings and natural geological features are faithfully replicated. As photogrammetry is a non-contact method, issues concerning the subjectivity of the recorder, repeatability of the record, and potential harm to the rock surface are all minimised. In addition, the ability to view the object in different ways precludes a single view-point perspective. Because the digital models are measurable, they provide considerable potential for comparative, quantified analysis of the carvings. With technology improving rapidly, these early results indicate that this technique has huge potential for accurate recording and monitoring of monuments and artifacts. Photogrammetry is highly recommended for specialists and amateurs.



3D model of Beanley portable stone from Northumberland, without surface rendering.



3D model of the Alwinton stone, Northumberland, with surface rendering.



Modern graffiti overlies prehistoric carvings on Ilkley Moor, West Yorkshire. Photographed by K. Sharpe.

## *Protection and Presentation*

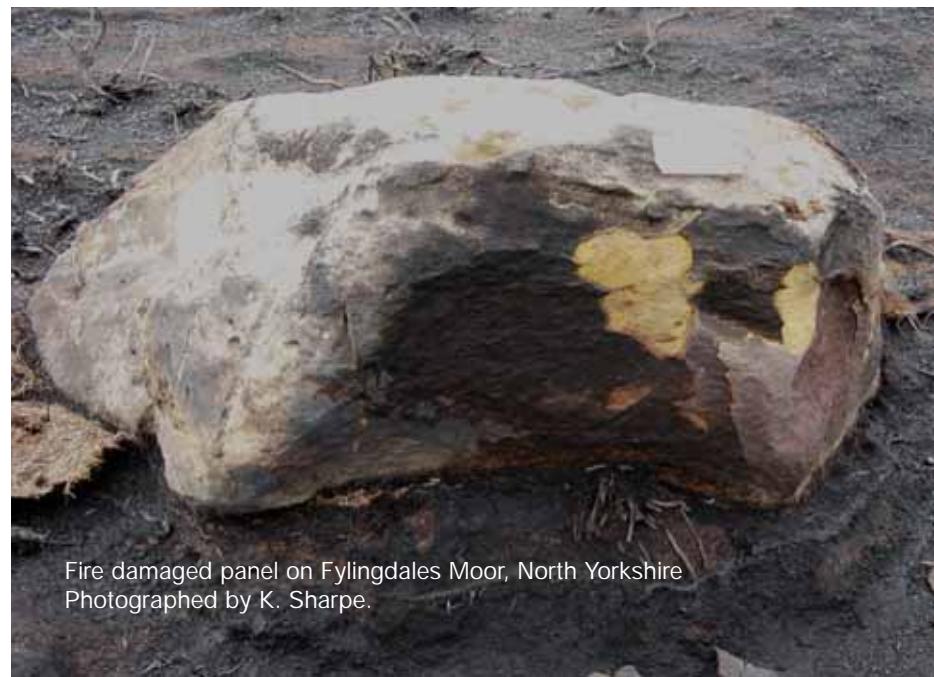
All rock art panels have eroded to some degree. Indeed, for the majority of engravings, erosion is very advanced and the motifs are only visible under good lighting conditions. Rock surfaces are unstable and are constantly deteriorating under the impact of both natural and human agents. It is likely that some carvings have disappeared entirely or are visible only as shallow depressions, often indistinguishable from natural geological features. Many motifs have been destroyed by natural weathering, with frost and water causing severe erosion of carvings on softer sandstone. Vegetation has also contributed – mosses hold moisture at the surface, some lichens make the surface more friable and roots break stones apart. Natural wildfires can cause major destruction but

also provide opportunities for discovering new information (see Fylingdales Moor case study on page 21). Many other examples may have been lost to quarrying, field clearance, road building, forestry and the increasing commercial development of the landscape.

At present, only a small proportion of known rock art panels are protected by law; very few are publicly owned. Part of the function of the ERA database is to hold information on the condition of rock art panels; this will allow the development of appropriate management strategies and help to ensure that the most vulnerable rock art panels are protected.-*Continued on p22*



Motifs covered by moss which holds water at the rock surface. Photographed by K. Sharpe.



Fire damaged panel on Fylingdales Moor, North Yorkshire  
Photographed by K. Sharpe.



Rock art panel on the heather moor at Fylingdales, before the fire. Photographed by K. Sharpe.



The same rock art panel after the fire. Photographed by K. Sharpe.

## *Case study 2: Fylingdales*

On 17th September 2003, an intense fire swept across Fylingdales Moor in North Yorkshire, taking several days to control. The fire stripped the landscape, revealing a wealth of archaeological features, including many new rock art panels. Local rock art enthusiasts were already aware of approximately 120 rock art panels on the moor; the fire revealed a further 80. However, as the devastating fire burnt away peat and vegetation to reveal the carved stones, it also caused serious damage to a number of them, burning surfaces and making them more vulnerable to weathering.

Subsequent recording, management and re-vegetation operations were undertaken during a major project involving the North York Moors National Park Authority, Fylingdales Estate, the Court Leet, English Heritage, English Nature (now Natural England), specialist consultants and DEFRA. A particular concern was the impact of the intense heat which causes rock to expand and contract. This can lead to cracking and spalling of flakes of stone, and to the absorption of moisture which, due to freeze/thaw action, causes further damage. The chemistry of the rock is also irreversibly altered, affecting the cements that hold the rock particles together. An additional impact was the stripping of the mats of roots and vegetation which had partially covered many of the carved rocks. The burnt material adhered strongly to the stones when dry but could be eased away when wet – which some rock-art enthusiasts duly did to look for further carvings. This may, however, have further increased the vulnerability of the rocks to weathering and biological attack.

A range of recording techniques was employed on the moor. All the panels were recorded by local enthusiasts but a sample was chosen to provide a baseline record of condition against which to assess erosion and damage in future years. These panels were recorded by photogrammetry, and some were

also laser scanned. Accurate location is an essential part of site management, due to the difficulties of relocating sites in dense vegetation. The last few decades has seen increasing use of rotating chain flail cutters attached to tractors, both to create fire breaks and to harvest the heather. For an important panel of rock art to be ‘relocated’ by a flail cutter could be catastrophic. Guidelines have, therefore, been drawn up for use of chain flail cutters on areas where archaeological remains might survive.

A particularly important discovery was a stone slab decorated in the ‘passage tomb’ style, in a monumental setting. Initially, the exposed decorated upper edge of the stone was noted by archaeologists, but further carvings were subsequently exposed by well-meaning visitors. This prompted an urgent excavation and recording exercise prior to the stone being re-buried in-situ (since it formed just one element of a much larger monument), and raised the issue of the potential vulnerability of particularly distinctive or unusual stones. The North York Moors National Park Historic Environment Record contains details of several carved stones which have been removed from the moors ‘for safe-keeping’ and a number of cup-marked stones have been inverted by enthusiasts to hide the markings and thus make them less accessible to thieves, but also frustrating bona fide researchers.

The acquisition of laser scan data for this particular stone, in addition to providing a detailed record for study and monitoring purposes, has also allowed the creation of a precise replica for an exhibition at Whitby Museum. This was developed in association with a guided trail around part of the landscape affected by the fire (now Open Access) in an attempt to illustrate the wide-ranging archaeology of the area without putting the more sensitive features at risk of disturbance or erosion.





The Eden Hall Stone on display at the Tullie House Museum, Carlisle, Cumbria.  
Photographed by K. Sharpe.

## *Protection and Presentation* cont. from pg 19

### Natural threats

The most significant threat to rock art is water. This acts on the chemical and physical structure of the rock to dissolve and weaken the cement matrix. The problem is increased by:

- removal of cover which protects the rock surface, such as turf or lichens;
- encouragement of cover that retains moisture or attracts it to the surface, such as vegetation, mosses, and some artificial coverings;
- abrasion or impact on weakened surfaces, for example by animals or humans, or even strong winds; and
- repeated episodes of exposure followed by concealment, which prevents the formation of a protective patina.

### Human impact

We can't do much about the destructive English weather but we can ensure that we do no additional damage so that the carvings have a better chance of surviving. Experiencing rock art

in its original context in the countryside is generally the most appealing option for physically able people, but human impact represents potentially the most profound short-term threat to rock art. Increasing visitor numbers are starting to have a noticeable effect on rock carvings in more accessible areas such as Ilkley Moor in West Yorkshire. The following approaches have been successfully applied in some areas and may help to limit the damage caused by increased public attention.

### Protective measures

Where a site is actively managed it is sometimes possible to minimise human impact by controlling visitor movement around the site using walkways or strategically placed natural obstacles, or through more direct approaches, such as the use of barriers to keep people (and animals) away from the carved surfaces. Protective devices such as Perspex screens, fences, and railings have been used for this purpose. It may even be appropriate to bury the carving and replace it with a replica. This method was used at Fylingdales Moor (see Case Study 2) with the replica being placed in the local museum, and

also at Gardom's Edge in the Derbyshire Peak District where a replica made of polyester resin reinforced with fibreglass was placed near to the buried panel.

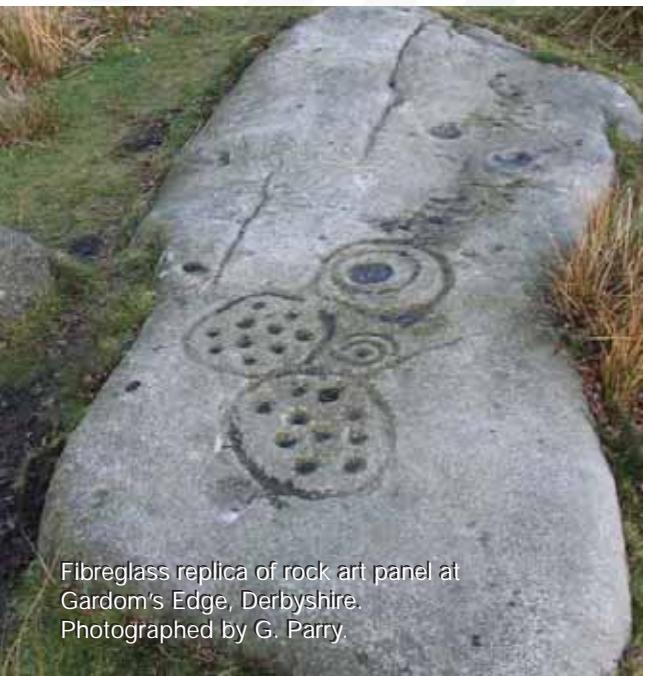
## Education

Information about the factors impacting on rock surfaces allows visitors to be well-informed and respect conservation and management decisions. Guidelines (such as those in this brochure) may prevent instances where well-meaning members of the public have cleaned rock surfaces to remove lichen, or pulled back turf to expose fresh carvings.

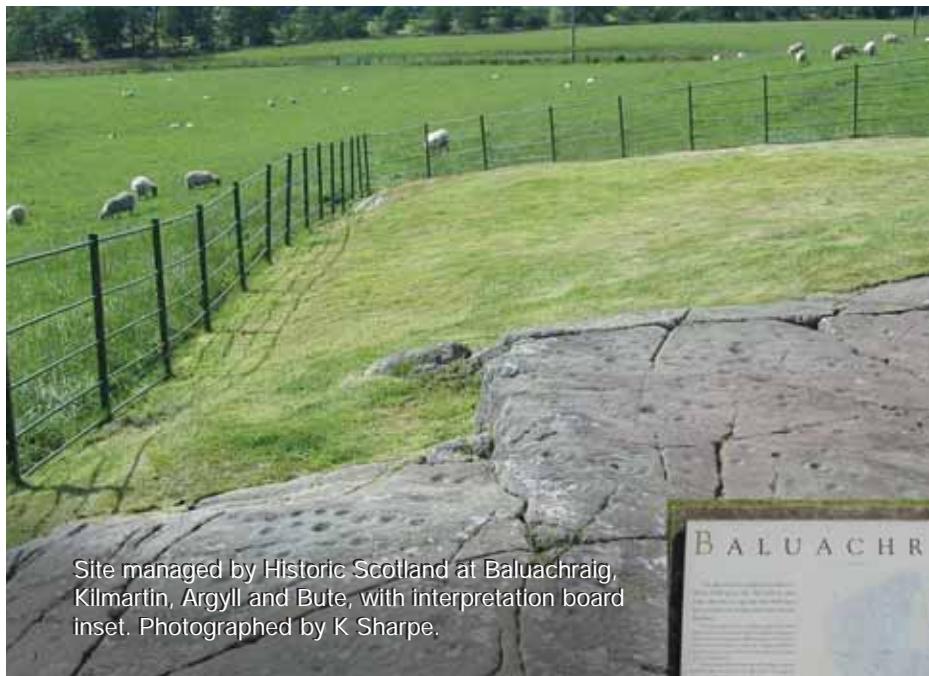
## Remote access

An alternative to visiting rock art in situ is the presentation of carvings in museums, interpretation centres and on the internet.

Those museums in England which display carved panels are often located close to concentrations of rock art, and provide an opportunity to inform visitors before they visit the panels in the landscape. Developments in computer imagery also provide exciting new ways of capturing and presenting rock art in its physical and cultural settings, with the added benefit of virtual reality reconstructions of past landscapes. The development of on-screen three-dimensional reconstructions from digital data raises numerous possibilities for versatile remote access on computers in schools, tourist information centres and visitor centres, as well as the internet <http://archaeologydataservice.ac.uk/era>.



Fibreglass replica of rock art panel at Gardom's Edge, Derbyshire.  
Photographed by G. Parry.



Site managed by Historic Scotland at Baluachraig, Kilmartin, Argyll and Bute, with interpretation board inset. Photographed by K Sharpe.

## What can you do to help?

As very little of the rock art in England is publicly owned, heritage managers are limited in the ways in which these sites can be managed.

The responsibility for preserving the rock art rests with each one of us and there are a number of ways in which we can ensure the carvings survive to be studied and enjoyed by future generations. The guidelines on page 27 have been developed based on experience and current understanding

of the way carvings are impacted upon by human activities. Should you have any concerns about the protection of any of the carved panels you have visited please contact the relevant local County Archaeology Department. Current contact details can be found on the ALGAO website at <http://www.algao.org.uk/>



Rock art in the garden at Ashover Primary School, Derbyshire. Photographed by K. Sharpe.

## *Case study 3: The Ashover Rock Art Project*

When schoolteacher Marisa Signora and parent Paul Watton accidentally discovered two ancient stones with markings in the grounds of Ashover Primary School, in Derbyshire they decided to set up a project to investigate and interpret the rock art. With the support of Local Heritage Initiative funding, The Ashover Rock Art Project combined natural and archaeological heritage into one project involving the local community and schoolchildren. The project included the conservation of the carved stones, installation of interpretation panels, production of a leaflet, and even extended to an investigation of Bronze Age life and landscape, with children learning through the construction of a roundhouse. A high level of interest was aroused in the local area with almost 500 volunteers involved from across the community, including school children, parents and people of many different professions. The project raised the awareness of both local people and visitors to the area and provided opportunities for volunteers to learn skills from working with experts. A huge level of local pride in the historic past of Ashover, its local distinctiveness and community was recognised.

Archaeology is not, in itself, part of the National Curriculum, but activities supporting an archaeology project include Design and Technology, History, Art, English and Sciences. Archaeology is a fun way of learning for children. It lets them come into contact with the past and excites their imagination. Most schools would not attempt to take their pupils on a 'real' archaeology dig, but the rewards of a large archaeology project can include improved results for the students and very good publicity for the school.

At Ashover Primary School, pupils reproduced the markings on the stones in their art classes, and in history they looked at the way people lived 3000 years ago. They were also involved in making a permanent reminder of the rock art through castings, which will go on display around local museums before reaching their final place at Sheffield Museum. The project also helped to conserve the rocks themselves, which are kept in the school grounds to weather naturally over time. They can be visited by the public who are requested to report to the school office.



Carved kerbstone at Weetwood Cairn, Northumberland. Photographed by B. Kerr.



Old Bewick, Northumberland. Photographed by A. Oswald.

# The Rock Art Code

## Always:

- ✓ leave the carved rocks and other archaeological features as you find them
- ✓ seek permission to visit sites that are not on publicly accessible land from the relevant owner or manager
- ✓ respect the environment and follow the Countryside Code

## Never:

- ✗ remove turf from buried rock art panels (the freshly exposed surface will be especially vulnerable to erosive processes)
- ✗ remove lichen from rock art panels (you may remove part of the rock surface and the tiny root fissures left behind will fill with water and be susceptible to freeze-thaw erosion, weakening the surface matrix)
- ✗ attempt to remove graffiti, chalk, or any anything else on the rock
- ✗ use any substances (including water) to 'clean' rock surfaces
- ✗ use brushes with stiff bristles (plastic or wire) to clean the rock (if you wish to remove leaf detritus or animal droppings from the carvings for your photographs then use a soft brush)
- ✗ use any metal tool (e.g. a trowel) to 'clean' the carvings
- ✗ add chalk or enhance the carvings using any other substance (this may interfere with accurate dating of the surface)
- ✗ undertake any recording technique that involves direct and/or repeated contact with the surface (e.g. wax rubbing)
- ✗ scratch your name or messages on or close to the carved panels
- ✗ walk or drive over carved panels
- ✗ make fires close to rock carvings
- ✗ light candles on the carved panels
- ✗ use sticky tape or other adhesives to fix scales to the rock

## Landowners or land managers with rock art

If you are fortunate to have rock art on your land, then the following steps are also recommended, but always seek professional advice and obtain any necessary permission such as Scheduled Monument Consent.

- ✓ encourage natural turf coverage
- ✓ cover panels that are most at risk from impact with a protective layer of turf (e.g. those on track-ways which cannot be re-routed or where panels are at risk from vehicular and mechanical impact, or from heavy animal and human impact)
- ✓ gradually thin woodland and dense vegetation immediately around rock art
- ✓ gradually remove forestry in the immediate vicinity and prevent replanting close to carved rocks (if replanting leave rock art in clearings and design forestry to respect the setting)
- ✓ lower stock levels on land with rock art to the minimum required to maintain vegetation levels
- ✓ remove large stock (cattle) from areas with carved panels
- ✓ undertake low-level maintenance and monitoring to remove leaf and vegetation litter and animal droppings from rock surfaces

The following approaches should be avoided without professional consultation:

- ✗ any interventionist methods that interfere with the carved rocks and invariably alter and often harm the rock art
- ✗ introduction of any changes that will rapidly alter the surroundings of the rock and have an impact on its surface
- ✗ use of artificial coverings of any form
- ✗ use of stabilising substances



Buttony 4, Northumberland. Photographed by B. Kerr.

The Northumberland and Durham Rock Art Pilot Project was sponsored by English Heritage and managed by Northumberland and Durham County Councils.

The NADRAP Team were:

- Kate Sharpe, Project Officer
- Tertia Barnett, Project Officer (2004-2006)
- Sara Rushton, NCC Conservation Team Manager
- Chris Burgess, NCC Conservation Team Manager
- David Mason, DCC County Archaeologist
- Richard Stroud, Volunteer Co-ordinator
- Paul Bryan, Metric Survey Team, English Heritage
- The NADRAP Volunteers:

Caroline Allott, Kenneth Allott, Mike Allport, Marie Armstrong, Alan Atkinson, Bryan John Atkinson, Jean Atkinson, Mike Atkinson, Tom Barkas, Samantha Belcher, Paul Bell, Graham Benfell, Jo Bird, Kenneth Black, Yvonne Black, Ruth Brewis, Graham Bristow, Shirley Brown, Vic Brown, Belinda Burke, Jeff Canavan, Lynsey Capper, Linda Carpenter, Keith Cooper, Steven Cooper, Peter Cornish, Ian Craig, Mark Alan Creighton, Andy Curtis, Russell Dawson, Alan Dougherty, Carol Dougherty, Helen Chimirri-Russell, Keith Elliott, Ken Fairless, Jean Findlay, Mike Findlay, Susan Findlay, Joanne Foster, Amanda Gadema, Oscar Gates, Joseph Garbarino, Joe Gibson, Christine Goodwin, Belinda Goyder, Bill Goyder, Derek Gunby, Hattie Hammersmith, Bob Harrison, Susan Haywood, Tessa Heads, Mike Hoadley, Mike Hodgson, Teresa Hodgson, Sara Holland, Alfred Hughes Harris, James Jackson, Anne Jenner, David Jones, Matt Kerr, John Leslie Knight, Frigga Kruse, Maureen Lazzari, Jenny Lee, James Lynn, Jeff Lynn, Kevin Malloy, Richard McDonough, Bernard O'Neill, Brian Oliver, James Outterson, Laura Parkin, Colin Pearson, Annie Robinson, David Robinson, Jonathon Shotton, Paul Southgate, Fraser Stewart, Richard Stroud, Peter Swailles, Mollie Taylor, Brian Thompson, David Thomson, Sue Thompson, David Tuck, Gwen Tuck, Paul Twinn, Joanne Walton, Susan Veitch, Neil Wallace, Janet Wilkinson, Lynette Willoughby, Kate Wilson, and Andrew Wood.

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## Contact Us

Further details of the NADRAP Project and additional copies of this brochure can be obtained from Northumberland County Council. Please contact [archaeology@northumberland.gov.uk](mailto:archaeology@northumberland.gov.uk) or write to Conservation Team, County Hall, Morpeth, Northumberland NE61 2EF

# British Rock Art on the Internet

The ERA website: <http://archaeologydataservice.ac.uk/era>

**The British Rock Art Collection** [www.rockartuk.fotopic.net](http://www.rockartuk.fotopic.net)

**The British Rock Art Blog** [www.rockartuk.wordpress.com/](http://www.rockartuk.wordpress.com/)

**The British Rock Art Group** [brag.archanth.cam.ac.uk/](http://brag.archanth.cam.ac.uk/)

**The Modern Antiquarian** [www.themodernantiquarian.com/](http://www.themodernantiquarian.com/)

**The Megalithic Portal** [www.megalithic.co.uk/](http://www.megalithic.co.uk/)

**Megalithics** [www.megalithics.com/](http://www.megalithics.com/)

**Yorkshire Rock Art** [www.cupstones.f9.co.uk/](http://www.cupstones.f9.co.uk/)

**Gardom's Edge, Derbyshire**

[www.gardomsedge.group.shef.ac.uk/rart.htm](http://www.gardomsedge.group.shef.ac.uk/rart.htm)

**Kilmartin House Museum** [www.kilmartin.org/](http://www.kilmartin.org/)

**Knowth & Newgrange** [www.knowth.com/index.htm](http://www.knowth.com/index.htm)

## Books on British Rock Art

(A more comprehensive reading list is available on the ERA website – see above)

Beckensall, S. 2001. *Prehistoric Rock Art in Northumberland*. Tempus, Stroud.

Beckensall, S. 2002. *Prehistoric Rock Art in Cumbria*. Tempus, Stroud.

Beckensall, S. 2005. *The Prehistoric Rock Art of Kilmartin*. Kilmartin Trust.

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Beckensall, S. & T. Laurie. 1998. *Prehistoric Rock Art of County Durham, Swaledale, and Wensleydale*. Durham County Books, Durham.

Boughey, K. & E. Vickerman. 2003. *Prehistoric Rock Art of the West Riding. Cup-and-ring-marked rocks of the valleys of the Aire, Wharfe, Washburn and Nidd*. West Yorkshire Archaeological Services, Leeds.

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Butter, R. 1999. *Kilmartin. Scotland's richest prehistoric landscape*. Kilmartin House Trust, Kilmartin, Argyll.

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