The caves of the Manifold Valley are of exceptional interest because, in addition to the stalactites and stalagmites so typical of show caves, they contain a treasure-trove of archaeological and fossil remains. Bones and artefacts reveal a history of human occupation dating back over 10,000 years, to the end of the last Ice Age. At various times, these cave dwellers co-existed in the landscape alongside mammoth, woolly rhinoceros, giant deer, arctic fox, lemmings, hippopotamus, auroch, wild boar and fierce predators such as wolf, cave bear, brown bear, hyaena, cave lion and lynx.

The early cave occupants had flint and reindeer-bone tools, lit fires and hunted big game such as reindeer, bison and horse. Barbed arrowheads, pots and pot boilers, beads, other personal adornments and early coinage suggest that later cave occupants or visitors were more sophisticated!

A member of UKRIGS, the Staffordshire RIGS Group is a voluntary organisation involved in the conservation of regionally important geological and geomorphological sites in Staffordshire. For more information contact:
Staffordshire RIGS - www.staffs-rigs.org.uk
North Staffordshire Group Geologists’ Association - www.esci.keele.ac.uk/nsgga
Staffordshire Wildlife Trust - www.staffs-wildlife.org.uk

Remember to follow the country code and please do not hammer the rock surfaces. Be safe, plan ahead and follow any signs; leave gates and property as you find them; protect plants and animals and take your litter home. Keep dogs under close control and consider other people.

A project managed by Patrick Cossey on behalf of the Staffordshire RIGS Group with financial support from Staffordshire Aggregates Levy Grant Scheme 2006. Text by Patrick Cossey, John Reynolds and Richard Waller. Design by Rosie Duncan. Photos by Patrick Cossey unless otherwise stated.

The Hamps and Manifold Geotrail
A Tale of Disappearing Rivers, Mineral Riches and Ice Age Beasts

The valleys have a long history of agriculture, mining and quarrying. Early man hunted, but later grazed animals and ploughed strip lynchets to grow crops. In Medieval times sheep and cattle were important. In the early 20th century milk was carried along the old railway to Leek.

Agriculture, tourism and outdoor pursuits are important today. Most of the land is designated as a Site of Special Scientific Interest (SSSI) for its geological and biological features. Much is owned and managed by the National Trust and Staffordshire Wildlife Trust, conserving the landscape for future generations.
INTRODUCTION

Welcome to the Hamps and Manifold Geotrail. This geotrail is intended to give the visitor a glimpse of the rocks, minerals and fossils of the area, together with a view of the work that water has done in cutting out the impressive scenery we see today. The 13 km (8 miles) trail provides easy access for all, mainly following the Manifold Track, a resurfaced section of the old Leek & Manifold Valley Light Railway line, between Hulme End and Waterhouses. This trail is written for southbound travellers but can easily be completed in reverse. It can also be done in sections using access points at Weag’s Bridge, Wetton Mill and Ecton Bridge.

Visitors are encouraged to view all features of interest from the Geotrail itself unless a permitted access route away from the trail is indicated. To fully appreciate the trail, or any trail section, visitors will find it useful to read the background information overlaid.

13-21 WETTON MILL TO WEAG’S BRIDGE

Above Wetton Mill is Nan Tor Cave 13, one of many local caves formed by the solution action of underground water on Limestone at an earlier stage in its history. The Milldale Limestones cut by the river as it meandered through the valley at an earlier stage in its history. One of many local caves formed by the solution action of underground water on Limestone.

22-32 WEAG’S BRIDGE TO WATERHouses

South of Weag’s Bridge, the trail curves away from Beeston Tor and the Hamps and Manifold confluence, and begins to follow the Hamps valley upstream towards Waterhouses.

Further on dramatic views of reef limestone appear at Thor’s Cave 18. This cave was formed thousands of years ago by underground streams flowing below the floor of the river. At that time the river occupied a higher level in the valley than it does today. Since then the valley has deepened, exposing these ancient cave systems. High on the cliff, below Thor’s Cave, a mass of reef limestone wedges out between beds of the Milldale Limestones. These rocks can be seen at Ladydale Wood, 19, where they are overlain by the Ecton Limestones. More exposures of the Milldale Limestones occur to the south 20, 21.

Beyond a prominent fan and river terrace 29, the trail meets the Leek-Asbourne road (A53). Turn west towards Waterhouses.

Go into Brown End and proceed through Smidley, with the high (“knoll-reefs”) and low (“cirques”) Limestones visible in the cliff face on your left. Beyond Redhurst Swallet 16 and Redhurst Crossing 17, a large expanse of Waterhouses Limestones is visible on the right.

cut by the river as it meandered through the valley at an earlier stage in its history. This is best seen from a prominent view point to the south.
The limestones of the Hamps and Manifold area were formed in warm tropical seas 325-355 million years ago. This was during the Carboniferous Period when Britain lay close to the equator, near the southern margin of the ancient continent of Laurussia. The seas teemed with life and brachiopods, corals and crinoids all flourished. Collections made by local teacher Samuel Carrington (1798-1870) are in national museums. His gravestone in Wetton churchyard has carvings of local fossils.

The rocks were formed by the deposition of layers of sediment, mostly shell debris and mud, that were later compacted and cemented by calcium carbonate. Limestone that lack obvious lens-shaped masses of reef limestone and thin shale. This was during the Carboniferous Period when Britain lay close to the equator, near the southern margin of the ancient continent of Laurussia. The seas teemed with life and brachiopods, corals and crinoids all flourished. Collections made by local teacher Samuel Carrington (1798-1870) are in national museums. His gravestone in Wetton churchyard has carvings of local fossils.

Later, these deposits were buried beneath younger Carboniferous rocks of the Millstone Grit and Coal Measures. At the end of the Carboniferous, as Laurussia and Gondwana collided to the south, the rocks were deformed, uplifted and eroded during an episode of mountain building known as the Variscan Orogeny. The many folds, faults and fractures (joints) in the area, date from this time. The folds form part of a larger upfold, the Ecton anticline. Later, hot fluids circulating through the fractures deposited valuable minerals. The spectacular gorges of the Hamps and Manifold valleys were formed by the erosive effects of running water on the Carboniferous Limestone plateau during the last 2 million years - a period of dramatic climatic variations called the Quaternary Period. Limestones are soluble in rainwater (a weak acid), and typically dissolve rather than wear away. They are also well-jointed and highly permeable allowing water to pass through. Water percolating underground slowly widens these joints to form extensive underground cave systems. The caves develop best in the reef limestones rather than the surrounding thinly bedded limestones, as the reef limestones are physically stronger and do not collapse as the caves form. Old dry caves, visible on the valley sides, were formed beneath the valley floor when the land surface was much higher. The rivers respond rapidly to rainfall variations. This also affects the level of the groundwater. In dry weather, water sinks into the ground via ‘swallets’ and the surface rivers run dry. During wet weather, water often bursts out of the river bed via resurgence as the subterranean passages fill quickly. Rivers then flow at the surface.

Later, production declined and the mines were owned by the Dukes of Devonshire and the Burgoyne family. Production peaked in the late 18th century at over 4000 tons per annum. Whole families were involved in the mining operations. Men mined the rock containing the ore, then boys pushed it out of the mine in trucks. On the dressing floors, women and girls crushed the ore to separate it from the waste. The concentrate was taken by packhorse to smelting furnaces, firstly at Ellastone and Denby, then, after 1770, to the Whiston smelter fuelled by coal from the Cheadle Coalfield. Later, production declined and the mines closed in 1889. The remains of the engine house, tips, mineshafts and entrance adits can still be seen, but these must not be entered. Waste from the mine tips was used to build roads and the trackbed of the old Manifold railway, completed in 1904. Limestone quarries at Brown End, Apes Tor, Dale and elsewhere provided stone for barns, houses and drystone walls. Old limekilns seen in the area are a relic of the days when lime was used to neutralise acid soils. Limestone is quarried today at Waterhouses and Cauldon for cement and aggregates.