

Higher Kiln Quarry Management Committee

Research Invitation

Outline

This is an invitation to bona fide researchers into natural history and earth sciences to participate in research at Higher Kiln Quarry, (HKQ) Buckfastleigh, Devon.

The quarry has a number of features, which make it scientifically unique in the United Kingdom, and facilities exist to enable new research and the study of previous research and data collections.

The HKQ Management Committee invites academic, industrial, skilled amateur and other researchers to participate in studies designed to further our knowledge of the quarry, its contents and its environment, and to submit outline project summaries for consideration by the Committee.

This document constitutes a description and prospectus of Higher Kiln Quarry and the scope for its continued research,

Higher Kiln Quarry

In 1961 an opportunity arose to acquire Higher Kiln Quarry at Buckfastleigh in Devon as a basis for the development of Britain's first cave studies centre, a unique role which it still fulfils.

The quarry was excavated from a reef of Devonian limestone with an estimated age of some 350 million years, some of the oldest limestone in England. The local geology is complex and only partly understood. It features extensive spreads of pyroclastic material with embedded outcrops of slates and limestones. All of these rocks are intensively faulted and contorted.

The juvenile River Dart may have contributed to the phreatic conditions which led to the formation of the series of caves, which are the most extensive known in Devon. The quarry and caves now stand on a raised river terrace of the Lower of Middle Pleistocene period, indicating that the draining of the caves occurred around half a million years ago, making the caves some of the oldest in the British Isles.

The Caves of Higher Kiln Quarry

Reed's Cave

The largest and most beautiful of the quarry caves. It is well-decorated with a variety of calcite formations and has a meteorological connection with the nearby Baker's Pit Cave. The cave was explored and surveyed by the Devon Speleological Society in 1939 and is in a good state of preservation. It also houses a thriving bat colony.

Rift Cave

This is a relatively short fault cave with a strong draft at the rear. A new species of blind amphipod, *Niphargus glennei*, was collected from here in 1961.

Joint Mitnor Cave

This cave contains the richest deposit of mammalian remains of the Last Interglacial period yet found in a British cave, dating from c. 100,000 years old. The remains include hyena, elephant and hippopotamus, which fell down a pitfall from the surface, now closed. Only a small portion of the deposits has been excavated and the cave is fitted with a walkway and electric lighting to enable the demonstration bone section to be viewed.

Spiders' Hole

The smallest of the caves named after the species of arachnid *Meta menardi*, which occurs there in considerable numbers.

The variety of fauna within the caves is matched by the complex ecology of the quarry itself

The scope for research at the Centre.

The Cave Studies Centre has formed the base for a number of studies on the geology of Buckfastleigh, the formation and contents of the caves, and the natural history of the caves and the quarry. A shortened bibliography at the end of this document gives some idea of the breadth of research.

Nevertheless much remains to be done. The complex geology of the area and the nature of Devonian limestone deserves further study. The individual surface and subterranean natural history studies have yet to be collated into a comprehensive ecology. The only underground meteorological study yet made concentrated solely on the entrance to Rift Cave.

We do not have an accurate age for the caves, or a detailed view of their formation. We have yet to determine what action should be taken to conserve the caves and quarry or what features might require specific action. The bones of a variety of Upper Paleolithic fauna have been removed from the deposit and identified. No work has been done on the corresponding microfauna and flora and the ecology of the period. DNA research on deposits of this type is also an untested science.*

***N.B. The bone deposits are protected and any further research will be conducted with reference to the Palaeontology Department of the British Museum of Natural History**

With these points in mind the Management Committee has prepared the following research objectives. All proposed research projects based-upon the quarry will be considered, but those related to these objectives deserve special consideration.

1. Are conditions in the caves static or do they fluctuate?
2. Is there a pattern to fluctuations?
3. Are there discernible trends in cave conditions and if so could they be said to be for better or for worse?
4. Is Reed's affected by what is going on in Baker's?
5. If human beings go into a cave they generate heat, leave organic material and breathe out carbon dioxide. Does this have any discernible effect on cave conditions?
6. Is there a co-relation between what is happening in the caves and what is happening outside them?

Management of the Quarry.

The quarry is jointly managed by a Committee comprising the William Pengelly Cave Studies Trust Ltd (a registered charity), the Devon Wildlife Trust, and the Bat Conservation Trust. A general summary of the roles of each organisation is:-

D.W.T. Conservation and management of the quarry and its surrounds.

WPCST Management of the Cave Studies Centre.

BCT Bat conservation and data collection.

The WPCST and the Cave Studies Centre

The Trust exists to promote the education, conservation and study of caves and karst.

It currently fulfils these roles by:-

- ❑ The collection of relevant data and information and by making it available as a Library research facility (based in London).
- ❑ The operation of two World Wide Web Sites.
- ❑ The production of a thrice yearly Newsletter and, in alternate years, a scientific Journal *Studies in Speleology*.
- ❑ The operation of the Cave Studies Centre providing:-
 - ❑ Controlled access to the caves within the quarry and a base for cave studies in Devon.
 - ❑ A guided walks programme.
 - ❑ Cave conservation
 - ❑ Bat conservation
 - ❑ Accommodation, lecture hall, committee room, field studies room, storage, and changing facilities.
 - ❑ Maintenance of a demonstration palaeontological section.
 - ❑ A cave and karst museum

This work is complemented by the Data Collection facilities operated by the Bat Protection Group within the quarry and its caves, and by the quarry conservation work of the D.W.T.

These activities are shown diagrammatically in Figure One.

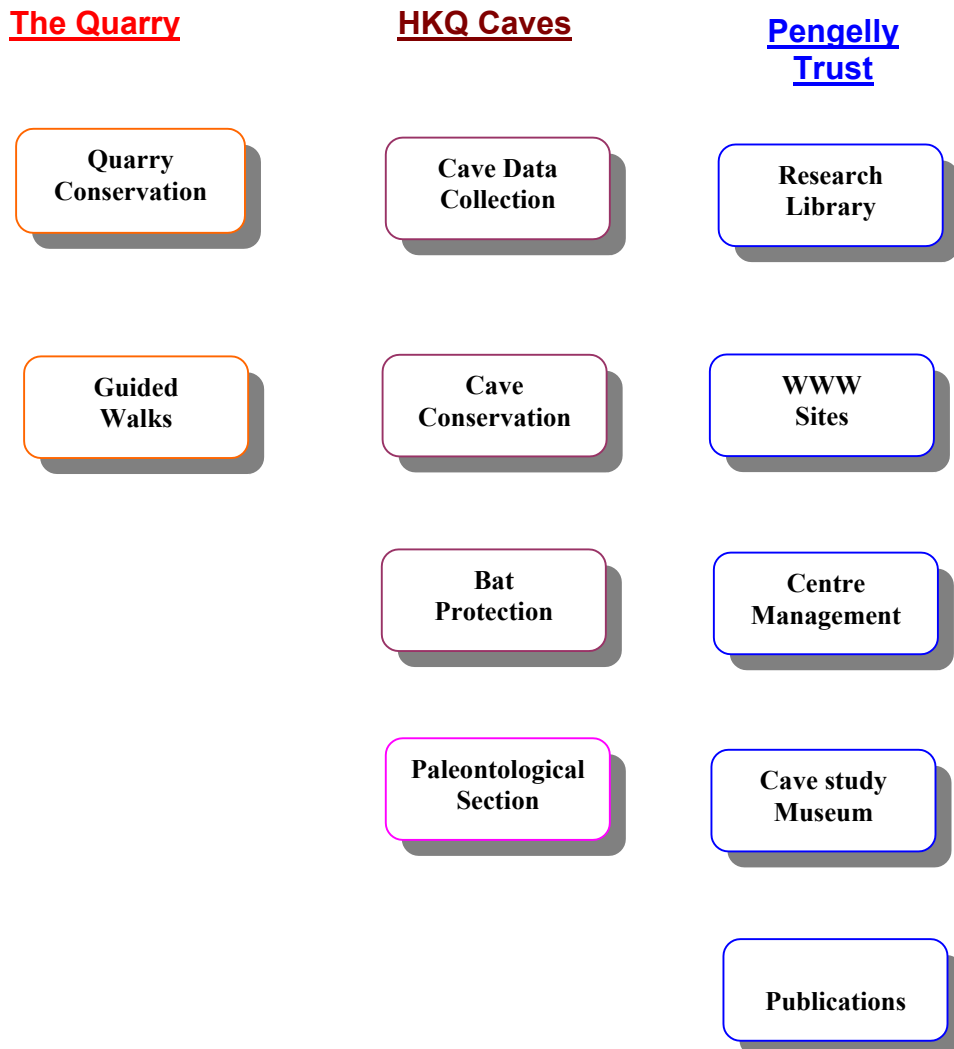


Figure One : Study operations related to HKQ

How can I find out more about the Trust and the Centre?

At the web site at <http://www.pengelly.org> you can - take a virtual tour of the museum; find a location map: listen to Edgar Reed's description of his discoveries: download the contents list of the Trust Library; read the contents list of the Trust publications : do a photo tour of the caves: and much more.

Who was William Pengelly?

William Pengelly F.R.S. 1812 - 1894 as his name indicates was originally a native of Cornwall, but he lived for most of his life in Torquay, Devon and achieved renown from his study of Devon caves.

He was self-taught and started work as a schoolmaster. His interests covered all of the sciences, but he soon realised the significance of the bone deposits in the Devon caves, and made his reputation by their systematic excavation, documentation and interpretation, at a time when palaeontology was in its infancy.

He once described Buckfastleigh as 'the very metropolis of caverns, at least, so far as Devon is concerned.' It is therefore fitting that the Cave Studies Centre at Higher Kiln Quarry should bear his name.

Data collection

A comprehensive data collection system has already been installed within the quarry and caves using instrumentation supplied by Skye Instruments Ltd. There are bat counters near to the entrances of the four main caves and each cave has a mains supply of electricity. The measuring devices are visited at intervals and data is uploaded into a portable computer. The configuration is shown diagrammatically in Figure 2.

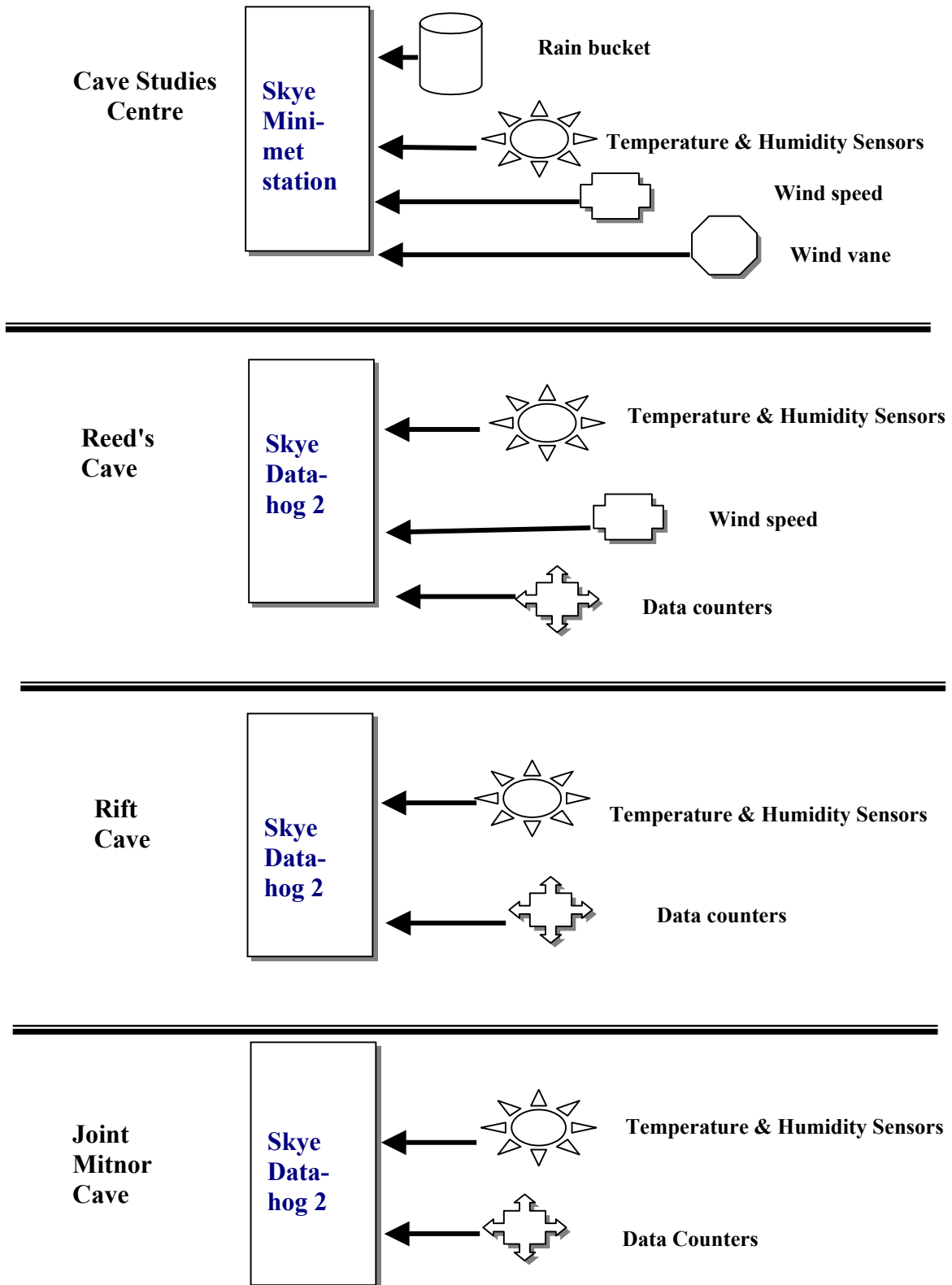


Figure 2 : Current instrument configuration at HKQ.

Two year's worth of data collected from this configuration is available in machine-readable form to researchers. The full facilities of the Cave Studies Centre can be made available to researchers, including the provision of a secure Field Studies Room.

From time to time the data collection regime will be reviewed and improved.

Arrangements for research.

Researchers should produce a project plan giving the objectives of their research; the resources to be employed; timescales and deliverables.

They will also need to indicate the degree to which they will require access to the quarry and caves and the projected use of the Cave Studies Centre.

These plans should be sent to Mr. Terry Radmore, Managing Director, Devon Wildlife Trust, Shirehampton House, 35 - 37, St. David's Hill, Exeter, Devon, EX4 4DA, who will bring them before the HKQ Management Committee for approval. The Committee will be assisted by representatives of English Nature who are responsible for safeguarding the site within the provisions of the Countryside & Rights Of Way Act 2000.

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