

---

# Northumberland National Park Geodiversity Audit and Action Plan

D J D Lawrence BSc

S L B Arkley BSc

J D Everest MA, PhD

S M Clarke BSc, MSc, PhD, FGS

D Millward BSc, PhD, FGS, CGeol

E K Hyslop BSc, MSc, PhD, FGS, CGeol

G L Thompson BSc, MSc<sup>1</sup>

B Young BSc, FIMM, CEng<sup>2</sup>

<sup>1</sup> Northumberland National Park Authority

<sup>2</sup> Formerly BGS

This publication and references within it to any methodology, process, service, manufacturer or company do not constitute its endorsement or recommendation by the Department of Communities and Local Government or the Minerals Industry Research Organisation.

Lists of sites in this publication have been compiled from many sources including previous reviews of the area's geology, published literature sources and BGS archives. Sites have been selected for their representativeness and geological merits. The listing of sites implies no rights of access. In all instances, access must be arranged in advance with the appropriate landowner.

## Copyright information

Maps and diagrams in this book use topography based on Ordnance Survey mapping. The National Grid and other Ordnance Survey data are used with the permission of the Controller of Her Majesty's Stationery Office. Licence No: 100017897/2007.

Copyright in materials derived from the British Geological Survey's work is owned by the Natural Environment Research Council (NERC) and/or the authority that commissioned the work. You may not copy or adapt this publication without first obtaining permission. Contact the BGS Intellectual Property Rights Section, British Geological Survey, Keyworth, e-mail [ipr@bgs.ac.uk](mailto:ipr@bgs.ac.uk). You may quote extracts of a reasonable length without prior permission, provided a full acknowledgement is given of the source of the extract.

Designed by infinite... [www.infinitedesign.com](http://www.infinitedesign.com)

Printed by Potts Printers, Newcastle upon Tyne.

© NERC 2007. All rights reserved ISBN: 978-0-85272-599-3

*Northumberland National Park Geodiversity Audit and Action Plan Litho (paper back) Commissioned Report 2007.  
CR/07/037N*

## Contents

Introduction

Acknowledgements

## **Section 1 Understanding geodiversity**

What is geodiversity?

The scope of this Geodiversity Audit and Action Plan

National Parks

The aim of this Geodiversity Audit and Action Plan

Geodiversity and the planning system

Protecting geodiversity

## **Section 2 Roots of our geological heritage**

Evolution of the rocks and landscape in the district

The influence of geodiversity in the landscape

Silurian rocks

Carboniferous rocks

Igneous rocks

Metamorphic rocks

Quaternary deposits and landforms

Mineral veins and minerals

Geological structures

Fossils and palaeontology

Mines and quarries

Building stone and the built heritage

## **Section 3 Exploring and celebrating geodiversity**

Education and research

Archive and materials collections

Interpreting the geodiversity of Northumberland

National Park and the surrounding area

## **Section 4 Geodiversity Action Plan**

Action plan

Geodiversity sites in Northumberland

National Park and the surrounding area

## **Glossary**

## **Selected bibliography**

## **Acknowledgements**

This publication was made possible largely thanks to the Minerals Industry Research Organisation (MIRO) who provided funding, from the Aggregates Levy Sustainability fund via The Office of the Deputy Prime Minister, for geodiversity studies in Northumberland National Park and the surrounding area. It is strongly guided by, and builds upon, the *Geodiversity Audit and Action Plan for the North Pennines Area of Outstanding Natural Beauty*; published in 2004, the first such plan to be prepared for a protected area in Britain. The encouragement of Chris Woodley-Stewart, the North Pennines AONB Officer, and Elizabeth Pickett, Geodiversity Officer, in the preparation of this publication is gratefully acknowledged.

Although it is impossible to name all involved, particular thanks must be offered to staff from Northumberland National Park Authority who have provided invaluable support and encouragement throughout the work, especially Iain Hedley, Rob Young, Albert Weir and Alison Jeffrey. Numerous staff within BGS have contributed in a variety of ways without which this book could not have been produced.

Additionally, we are indebted to the following for support and advice: Sara Frisby and Trevor Hardy at Northumberland Wildlife Trust and Jonathan Larwood, Claire Furness and Mike Sutcliffe at Natural England. Natural England are also thanked for their support for the project and financial contribution to the 'action planning' process. Janet Simkin is thanked for her information on the links between lichens and geodiversity. Essential input from the numerous quarry operators within the district is also gratefully acknowledged, together with the unfailing co-operation of landowners during field visits. Finally, thanks to the staff at infinitesdesign, most notably David Whitfield, for the skill and forbearance that have been fundamental in bringing this to print.

Maps and diagrams have been prepared within BGS, with the exception of the Yoredale Cyclothem diagram, which is by kind permission of Elizabeth Pickett.

Intermap Technologies Inc. are acknowledged for the provision of NEXTMap® 3D elevation data from which the illustrations showing hillshade models have been derived.

Photographs are by members of BGS staff, BGS©NERC, except where individually credited.

Thanks are especially due to Graeme Peacock for his assistance in sourcing photographs to show the characteristic landscape of the district, to Joel Porter for permission to use an image from his portraits of miners from Blenkinsopp Colliery, to Mr Alan Pringle, and to Roger Coulomb, Simon Fraser and Emma Amsden for permission to use photographs from collections they have provided to Northumberland National Park.

### **Bibliographical reference:**

Lawrence D J D, Arkley S L B, Everest J D, Clarke S M, Millward D, Hyslop E K, Thompson G L, and Young B. 2007. Northumberland National Park Geodiversity Audit and Action Plan. *British Geological Survey Commissioned Report, CR/07/037N. 128pp.*

### **The British Geological Survey**

This publication has been compiled by the British Geological Survey (BGS). BGS is Britain's national geological survey and has been in existence since 1835. It assists both public and private sectors by advancing geoscientific knowledge of

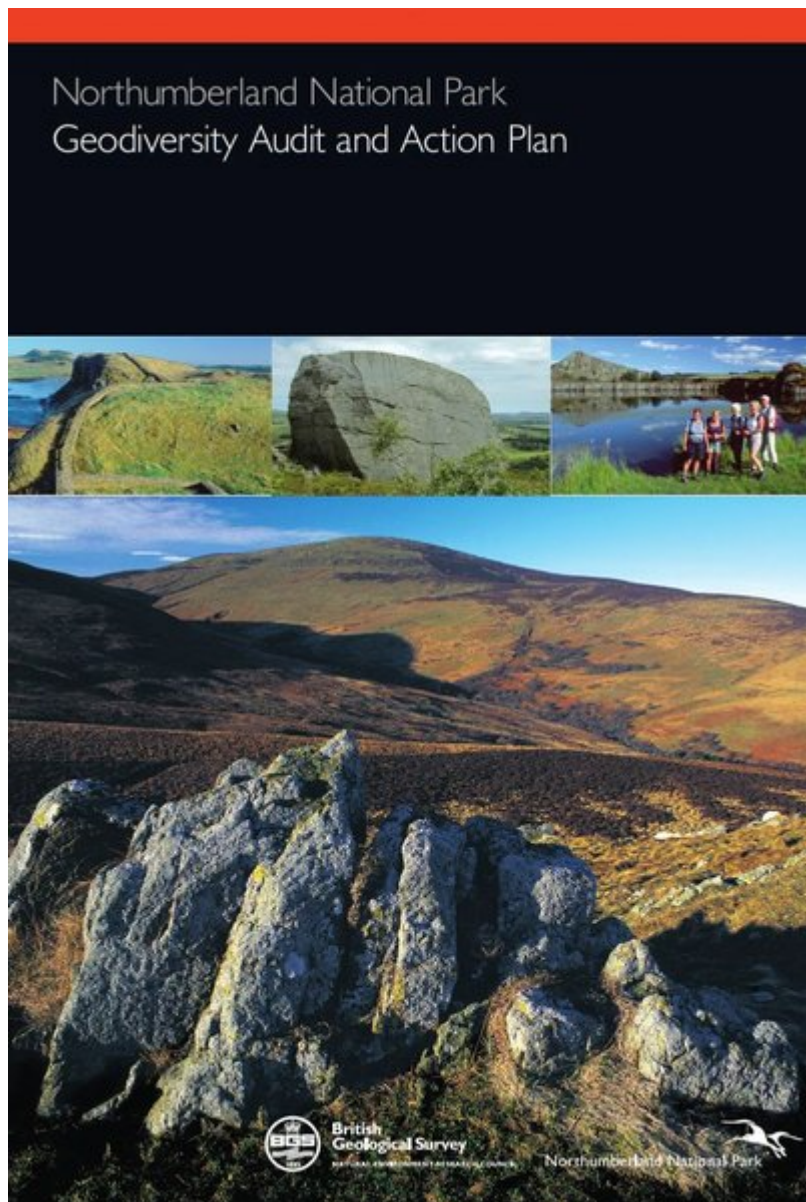
the UK landmass and its continental shelf, by systematic surveying, long-term monitoring, effective data management and high quality applied research. It provides comprehensive, objective, impartial and up-to-date geoscientific information, advice and services in the UK and overseas, and disseminates information in the community to promote the public understanding of science.

BGS is the largest of the research bodies administered by the Natural Environment Research Council (NERC), which was established by Royal Charter in 1965 to undertake and support basic and strategic research in the environmental sciences. NERC is independently funded, quasi-autonomous and non-governmental.

(Front cover) Cover images clockwise from top left: Hadrian's Wall above cliffs of Whin Sill, looking west towards Crag Lough © Graeme Peacock. The Drake Stone, a huge Fell Sandstone boulder near Harbottle BGS © NERC. Cawfields Quarry in the Whin Sill, now a recreation area © Graeme Peacock. Looking south-west from Long Crag towards the granite hills of Hedgehope and Cheviot © Graeme Peacock [www.graeme-peacock.com](http://www.graeme-peacock.com)

(Location map) Location map for the district described in this book.

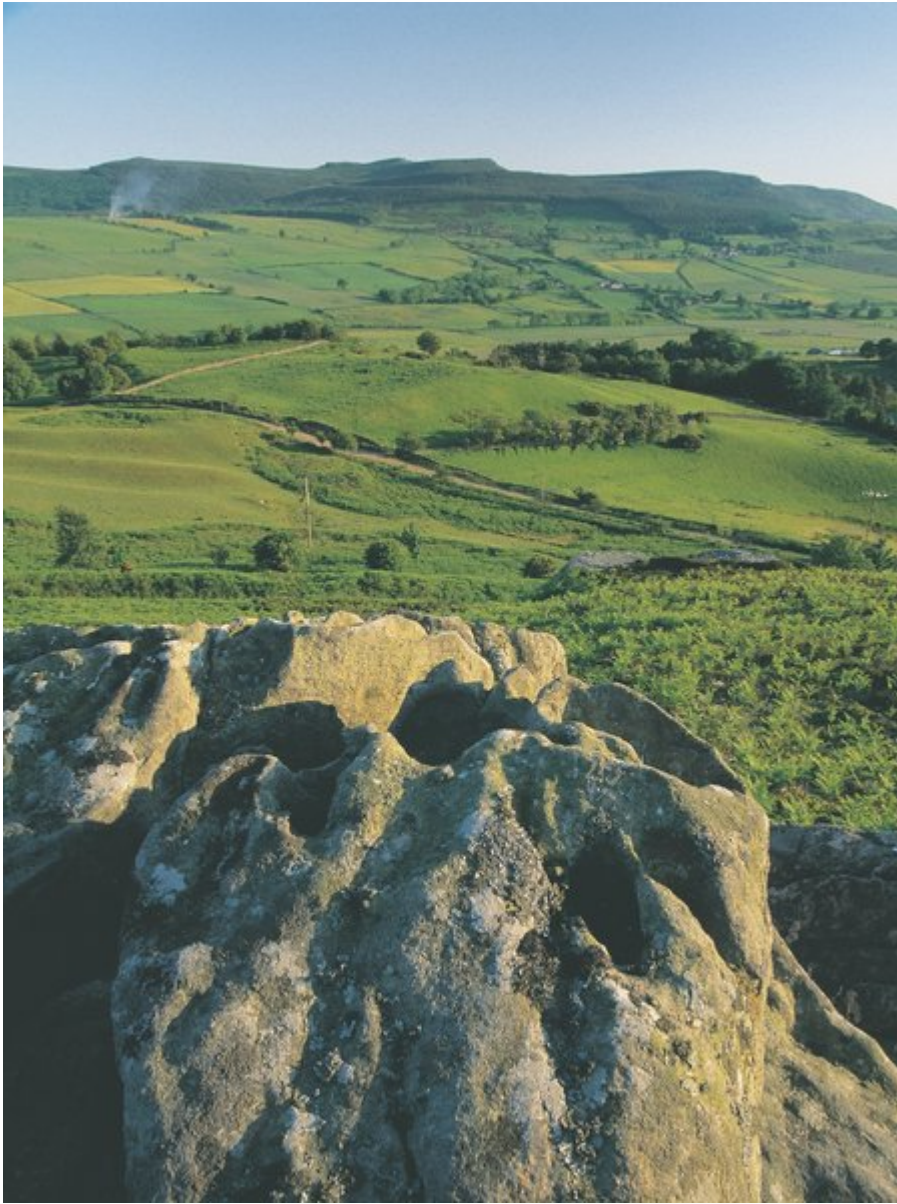
(Figure 1) The distinctive skyline of the Fell Sandstone ridge at Simonside viewed from Rothbury Terraces. © Graeme Peacock [www.graeme-peacock.com](http://www.graeme-peacock.com)



(Front cover) Cover images clockwise from top left: Hadrian's Wall above cliffs of Whin Sill, looking west towards Crag Lough © Graeme Peacock. The Drake Stone, a huge Fell Sandstone boulder near Harbottle BGS © NERC. Cawfields Quarry in the Whin Sill, now a recreation area © Graeme Peacock. Looking south-west from Long Crag towards the



(Location map) Location map for the district described in this book.



*(Figure 1) The distinctive skyline of the Fell Sandstone ridge at Simonside viewed from Rothbury Terraces. © Graeme Peacock [www.graeme-peacock.com](http://www.graeme-peacock.com).*